

Organic Gardening: Your Guide to Growing Healthy Organic

Michelle Anderson

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Your Guide To Growing
Healthy Organic Produce

Michelle Anderson

Organic Gardening: Your Guide to Growing Healthy Organic Produce

by Michelle Anderson

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Dedication:

This book is dedicated to my family, who has had to live with the ups and downs I've experienced while growing my organic garden plot. Thanks, guys. I love you all.

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Introduction



Gardening isn't as difficult as people tend to want to believe it is.

It isn't hard to plant a seed, water it and watch it grow. In fact, most of us did exactly that in grade school and watched as our budding plants sprouted from the rich soil in the Styrofoam cup we'd planted them in. While I'd be lying if I told you organic gardening was that simple, it's the same basic process, just on a much larger scale.

Gardening is a labor of love for most gardeners.

Most of us don't have to rely on the food we get from our gardens, but there's something to be said about self-sufficiency. There's also something to be said about the satisfaction felt while getting on one's hands and knees and working the Earth. If there's a better way to become at one with nature, I haven't found it.

I love sitting in and around my garden and watching how alive it is. Bugs and spiders scurry around. Birds, bees and butterflies flutter about. Rabbits, squirrels, gophers, deer. You never know what sort of wildlife may decide to make an appearance.

Whether you're passionate about plants or flowers or are looking for a cleaner and healthier way to grow produce, organic gardening is the way to go. You can create a sustainable garden that's friendly to the environment and is capable of producing the plants you want it to for generations to come.

Organic gardening is somewhat of a lost art, albeit one seeing a resurgence in recent years.

In this day and age of quick and easy processed foods, there's a growing group of gardeners who refuse to take the easy way out. We stand united against the constant barrage of chemical-laden foods and produce that proliferates grocery stores today. We don't use pesticides, herbicides, chemical fertilizers or any other synthetic materials in our gardens and guess what? Our families and our land are healthier for it.



The agricultural chemical industry would have you believe their chemical compounds are safe to use. They're powerful corporations able to grease the right pockets to keep momentum rolling in their direction. They thrive because people come to rely on the fertilizers, pesticides and herbicides they're peddling as the answer to all problems.

Organic farming is a threat to their bottom line. If they didn't feel threatened, do you think they'd be spending millions of dollars trying

to lobby for more regulations that only serve to hamper organic farmers from selling their produce on the open market?

Whether you're a home-gardener wetting your feet with a small organic garden or an experienced vet looking to expand your knowledge, you'll appreciate the tips and techniques set forth in this book.

What is Organic Gardening?

Organic gardening is an environmentally-safe form of gardening undertaken with the intent to eliminate harsh chemicals, herbicides and pesticides both from the land and from the dinner table.



Organic gardening is saying no to the chemicals commercially available foods are doused with.

While there are as many definitions for organic gardening out there as there are types of plants, it all boils down to one basic tenet. Organic gardeners don't use synthetic chemical compounds on the plants they grow in their gardens, instead opting to harmonize the plants in their gardens with nature.

They key to successful organic gardening is taking the steps needed to

ensure your soil stays healthy and rich. This is done by replenishing the resources consumed by your garden by adding organic matter back into the soil. You can create your own organic matter through a process called composting, which will be covered in detail in a later chapter.

A successful organic gardener picks plants suitable to the site where they're going to be planted. Trying to force a plant to grow in an environment not conducive to that plant's growth is a source of frustration for many budding organic gardeners. At the very least, it's going to take a lot of extra care and will consume more resources than a plant that's a good choice for the location.

This form of gardening isn't for the time-pressed individual. You have to be willing to invest the time it takes to be in tune with what your garden is telling you. The key to a successful organic garden is identifying problems before they get out of control and taking the steps necessary to put them to rest.

Why Go Organic?

There are a number of reasons people decide to go organic.

The biggest reason driving people to go organic is the fact that organically-grown foods are healthier than their chemical-laden counterparts. Studies have shown time and time again that people who consume organic foods are healthier overall than those who don't. It's hard to tie specific diseases and illnesses to non-organic foods, but the healthier lifestyle lived by those who go organic has proven an effective means of avoiding disease and illness.

Do people who eat organic foods still contract diseases and get sick? Of course they do, but the overall rate at which it happens is significantly lower. The reasons for this can likely be attributed to a number of concentric factors, some direct and some indirect.

Indirectly, people who consume organic foods tend to be more in tune with what's healthy and what isn't. They lead a healthier lifestyle and are physically healthier overall because of it.

In my opinion, the lack of chemical residue is the biggest reason people who go organic are healthier.

Trace amounts of the chemicals contained in herbicides, pesticides and fertilizers all make their way into your system when you eat non-organic produce. A single serving of food containing these trace chemicals probably isn't going to do too much damage. The problem lies in the fact that the human body doesn't recognize them and can't process them. The only thing your body can do is store them away somewhere like your brain, in your fat deposits or in your bones.

Over time, these chemicals build up into much larger amounts than what's considered safe. They start wreaking havoc on your immune system and all sorts of problems can pop up, not the least of which is cancer. By the time health issues start to crop up, it's largely too late to do anything about it. Your body is so polluted from the chemical cocktail you've been feeding it that it's on the verge of shutting down.

Switching over to organic foods puts an end to one of the biggest contributors to chemical compounds in your system.

It's high time we stop lining the pockets of the fat cat industry executives who have no problem poisoning people to expand their bottom line. If you still doubt the fact that you're slowly but surely

being poisoned, maybe this will change your mind.



Laws have been passed that allow fertilizer manufacturers to recycle hazardous waste from other industries into fertilizer. It's not just one or two companies doing it; it's most of them.

The California Public Interest Research Group Charitable Trust (CALPIRG) in conjunction with Washington's Safe Food and Fertilizer group recently tested 29 fertilizers sold in 12 different states for the presence of toxic metals.

Care to guess how many of them passed?

What did you guess? Half? Two-thirds? How about none? That's right, there wasn't a single fertilizer tested that passed. All of them contained toxic metals. Every single one. Some had more than others, but they all had all of the heavy metals tested for. Even more disconcerting is the fact that 20 of the 29 had levels higher than what's considered the level of concern.

Wondering how hazardous the metals they contained are?

Here are some of the heavy metals found in the study:

- ☐ **Aluminum**
- ☐ **Antimony**
- ☐ **Arsenic**
- ☐ **Barium**
- ☐ **Cadmium**

- ☐ **Chromium**
- ☐ **Lead**
- ☐ **Manganese**
- ☐ **Thallium**
- ☐ **Uranium**

There isn't a single one of these that you want anywhere near your dinner plate. Paint and plastic isn't allowed to have lead in it. Why is fertilizer?

The labeling laws for these fertilizers require that they list the amount of *helpful* chemicals, but the harmful chemicals aren't required on the labels. There's no way of knowing exactly what you're putting into your soil and leaching into your food.

Consumers are largely ignorant to what they're adding to their soil because the government doesn't require it to be put on the labels. I don't know about you, but I want to know when I'm putting a chemical compound in my yard that contains potentially harmful chemicals. I don't want to feed it to my grass and flowers, let alone spread it on soil where I grow produce.

It's an underhanded and tricky way of disposing of hundreds of millions of pounds of toxic waste per year right under our noses. You wouldn't want a toxic waste dump to be built down the street from your house. Don't allow your garden to become one either.

Another reason people are switching to organic foods is because studies have shown organic foods have more nutritional value.

In a recent study done by The Organic Center, 61% of the organic foods studied were nutritionally superior. Half of the samples found to be nutritionally superior had nutrient levels that were more than 20% higher than the conventionally grown samples.

Organic foods showed elevated levels of the following nutrients:

- ☐ **Vitamins C and E**
- ☐ **Quercetin**
- ☐ **Polyphenols**
- ☐ **Antioxidants**

There's another reason I love organic foods and it's largely a selfish reason.

Organic foods taste better than conventional foods. I know this is

subjective, but I've found the organic foods I grow and buy tend to have more flavor. The fruit is sweeter and the vegetables are more flavorful and aromatic. I don't know why this is the case, but I suspect it has something to do with the chemicals used by big agriculture to promote faster food growth.

This isn't a scientific opinion, but I think allowing food to grow naturally allows it to develop the full flavor Mother Nature intended it to have.

Buy Organic or Grow Organic?



Well, seeing as this is a book on organic gardening, you have to know what's coming. I'm going to push growing organic foods over buying them, right?

Well, not entirely.

While I think everyone should grow as much organic produce as they have time and room for, I recognize there are people who don't have the desire or time to spend hours working in the garden. Some can't do it because they have physical limitations, while others would quite frankly rather be doing something else.

If you're not growing organic, then you should at the very least be buying organic.

The problem with buying organic food is it's significantly more expensive than conventionally grown food. You can save some cash by buying locally-grown foods at farmers markets or flea markets, but you're still going to end up spending more than you'd like.

For that reason, I suggest offsetting your costs by growing as much organic food as you possibly can, then buying the rest. The expenses associated with growing organically can be kept to a minimum if you keep your own compost pile and employ all-natural pest control. The savings you glean from growing your own organic foods will help

defray at least some of the cost of the organic foods you're forced to buy.

I like to look at it this way. If there's something I know I can do to improve my family's health, you'd better believe I'm going to do it. I'd rather cut corners in other areas of my life than compromise their health by putting contaminated foods on the table.

I'm not rich by any means, but I'm able to grow enough organic food to help cut down on my grocery bills, even when my cart's full of the organic foods I couldn't grow or raise.

To answer the question of whether to buy or grow, I say both. Unless you live on a farm, you probably won't be able to grow everything you eat. Grow what you can organically, and then buy the rest.



Soil Cultivation



Good, healthy soil is the foundation of a great organic garden. There are a number of soil-related tasks that must be completed before you plant your first seed.

Remove all weeds, rocks, grass and plant matter from the area you want to plant. Weeds will quickly multiply if left unattended and can crowd out your plants.

You can cut down any plants or weeds in the area and till them into the soil if you want to. There are a couple issues you need to be aware of if you decide to go this route. If the plants that you're turning under are full of seeds, you may have a problem with them germinating and starting to grow. Also be aware that decaying green plants use up nitrogen from the soil. Wait at least three weeks before planting if you turn plant matter under.

Once you've cleared the top of the soil, add a two to four inch layer of organic material to the top of it, then till it to a depth of at least 6 inches. If you have a small section to till, this can be done with a spade or a shovel.

Tillers are notoriously hard to turn and maneuver. Leave a row in between on each pass, then come back the opposite direction and get the rows you missed. This is easier than trying to fight the tiller into

position at the end of each row.

Don't till ground that's too wet. Tilling mud creates large clumps of dirt that dry into hard dirt clods. It also sticks to the tiller (and you) and makes an easy job ten times harder than it has to be. The goal is to get evenly distributed pieces of *friable soil*, which is soil that's easy to break up and almost crumbles in your hands.

You should also avoid tilling ground that's too dry. Tilling completely dry ground will cause it to break up into a fine powder that doesn't have any texture at all.

Check your soil by picking up a small dirt clod and rubbing it between your fingers. If it turns to powder, it's too dry. Try adding water and waiting a day or two for it to dry out. If it smears across your fingers or feels like silly putty, it needs more drying time. Soil that's ready for tilling will crumble into smaller pieces.

If you're breaking ground for the first time, set the tiller's engine speed low so the ground gets thoroughly turned. You're going to want to make multiple passes. Start shallow with the first pass and go an inch or two deeper with subsequent passes. Two to three passes should be enough to till new ground.

After tilling is complete, the soil needs to be of an even texture across the first three inches of soil. This is critical because it promotes root growth, aerates the roots and ensures adequate water drainage.

Roots grow better in loose soil because they're able to easily push their way to the nutrients and water they need. In compacted soil, the roots have to fight through the soil. The result is undernourished plants that are smaller than those grown in evenly textured soil.

Aeration allows enough oxygen to get down to the roots to promote faster growth.

Adequate drainage prevents the roots from sitting in soil that's too wet. It allows most of the water to flow past the roots, leaving behind just the right amount for the plant to live on.

Clay soils are difficult to aerate and may clump up even when almost dry. Mix one part coarse sand to every four parts of organic material you use to promote aeration and make clay soil easier to work with.

I've had some of my best gardens come from land on which I've employed a technique I call double tilling. I'll till it once to 6 inches. I wait until after the first tilling to add the organic matter. Then I till it again to 10 inches. This really works the organic material down into the soil.

If you're in an area that experiences freezes in the winter, you should cultivate your soil in the fall. This will help loosen up the soil and make it less susceptible to erosion. Till it once before the winter freezes hit, then till organic matter into the soil right before planting season.

Tilling and Turning Tools



Farmers of old used to be called sodbusters because soil had to be broken up manually. It was hard labor. If you plan on manually tilling your garden plot, the tools you'll use today haven't changed much in the last hundred or so years.

You'll want a good spading fork, a spade, a shovel and a hoe. A hand-powered cultivator can help with stubborn soil. Make sure you get one with big wheels or you're going to have a heck of a time pushing it through the areas you've already tilled.

Hand tools can be used on small plots of land, but you're going to want something a little more powerful if you have a plot bigger than about 2,000 square feet.

Luckily for us, there are tools available to use on the bigger jobs. Bigger sections should be tilled with a rototiller to ensure the organic material is evenly distributed throughout the soil. You can rent a rototiller from your local tool rental or hardware store. Get a tiller with 7 or more horsepower and you'll make short work of your backyard garden plot.

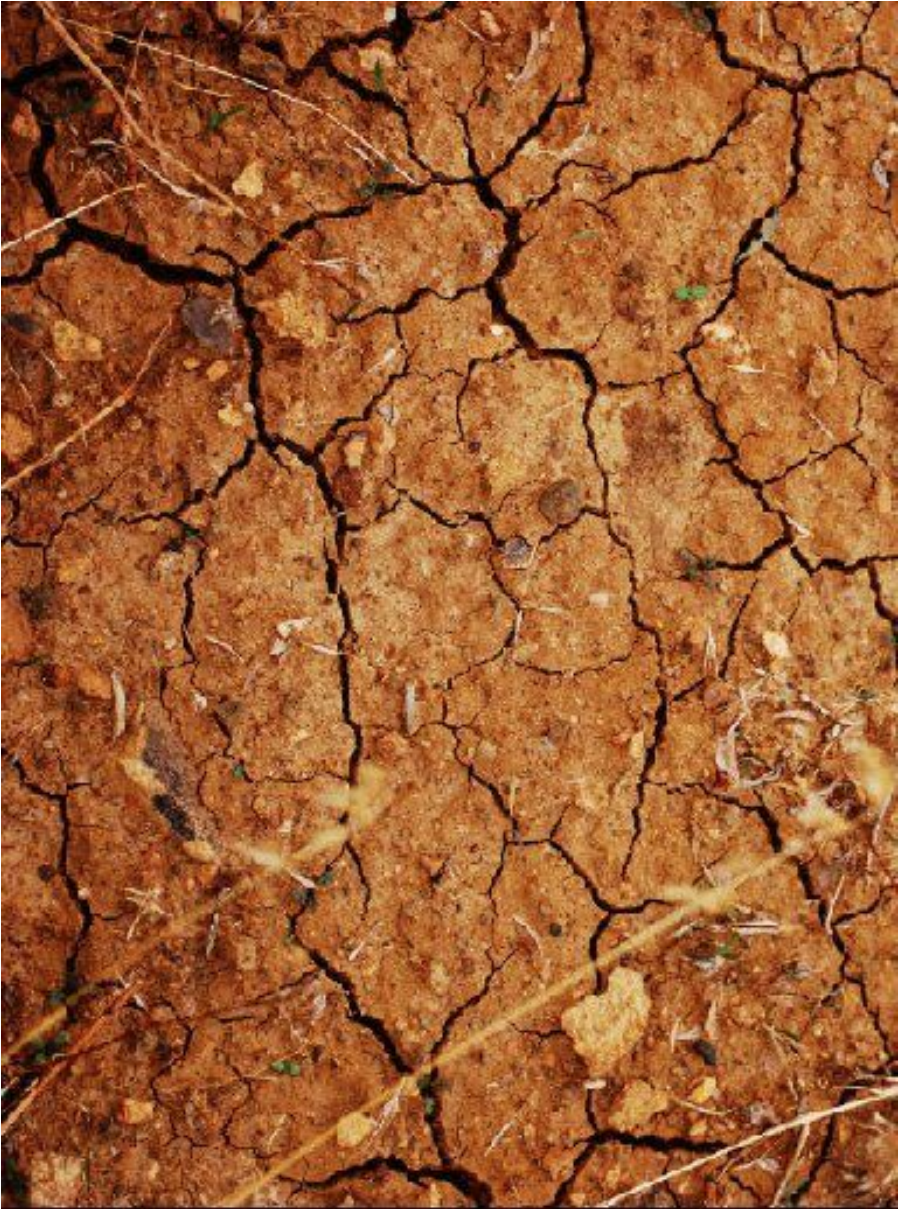
If you have a large plot that needs to be turned, you may be able to pay a local farmer to disk your plot. This is a good idea if you're planning on turning an area covered in grass into a garden plot

because it's much faster than doing it by hand.

Another option is to rent a tractor yourself. Walking garden tractors are tractors you walk behind that are capable of pulling plows and disks. The next step up is a small ride-on tractor. They're expensive to buy, but you can use them to mow your lawn as well. You may be able to rent one from a local heavy equipment rental store.

For bigger plots, you're going to need more horsepower. A good 20-HP tractor should get the job done. You're going to want a plow and a disk to pull behind it. Plow your land first, and then disk it to break up the larger chunks.

Soil Texture



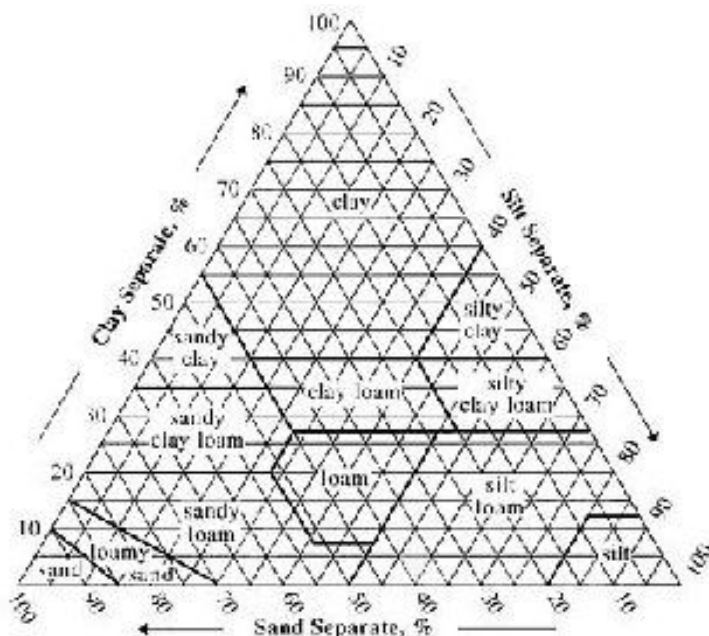
Soil is divided into three basic mineral sizes:

- **Clay (pictured above):** Many particles aren't visible under a light microscope. Soil containing a lot of clay drains and dries out slowly. It's hard to work with because it clumps up and is sticky when wet.
- **Silt:** Individual particles are visible using a light

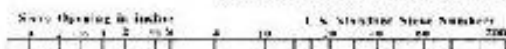
microscope, but can't be seen with the naked eye.

□ **Sand:** Individual particles can be seen with the naked eye. Soil high in sand (>50%) drains well, but is less fertile and dries out faster than the other soil types.

Soil texture refers to how much of each of the three mineral sizes a sample of soil contains. The following chart shows the various soil textures you might find in your garden.



COMPARISON OF PARTICLE SIZE SCALES



USDA	GRAVEL	SAND					SILT	CLAY
		Very coarse	Coarse	Medium	Fine	Very fine		

The best texture for soil is called *loam*. Loam contains roughly 45% percent mineral particles, 5% organic material and 50% air. The mineral particles are a mixture of 40% sand, 40% clay and 20% silt.

In order to better understand your soil and what you're looking at, you need to have a good idea of the type of soil you're dealing with. Luckily, there are a couple easy tests you can use to estimate your soil texture.

Mason Jar Test. Add four inches of soil to a Mason jar. Fill the jar with water to within a couple inches of the top. Add a teaspoon of Calgon to the water. Now, shake the jar as hard as you can for a full minute. Make sure the dirt is dispersed into the water. Let the

contents settle for 45 seconds. Measure the amount of dirt that's settled to the bottom. This is your sand content. If it's more than two inches, you have soil that's more than 50% sand. Wait five hours and measure it again. Subtract the sand measurement from your new measurement and you have your silt content. Subtract the total of the sand and silt combined from four inches and you have the total clay content.

Water drainage test. This test won't give you the exact texture of your soil, but it will give you a pretty good idea of what problems your soil is going to present. Dig holes in all four corners of your garden and one in the center. The holes should be about a foot deep and two feet across. Cover the holes with a sheet of plastic and give the soil in the hole time to dry out. Fill each hole with water and time how long it takes to drain. A hole that takes more than a half hour to drain indicates soil with a high clay content that is going to need to be watered slowly. If your hole drains in 15 to 30 minutes, you have good drainage. Soil that drains in less than 15 minutes has high sand content or cracking issues and is going to dry out fast when it warms up.

Most gardeners will never see a good loam soil. This begs the question of what you can do to "fix" your soil if you have one of the other soil types.

I hate to be the bearer of bad news, but you're largely stuck with what you have. Well, I guess you could bulldoze your garden plot down a couple feet and truck the dirt out, then replace it with expensive loam, but that's more than most people are willing to do.

The best way to "fix" soil that has too much sand or clay is to add more organic material to it. Increasing organic material reduces the level of minerals in the soil and creates *soil aggregates*, which are combinations of minerals and organic matter.

If you have really bad soil that's tough to work with, you can add alternating layers of peat moss and organic matter to your soil at the end of harvest season. Start with 2-inch layer of peat moss, and then cover it with 6 inches of organic material. Keep adding layers until you have a bed of at least 24 inches. Wet it down real good and let it sit over the winter. By the time planting season comes around again, you should have a good 8 inches of rich, workable soil. Add another 3 to 4 inches of organic material in the spring and till it in and you'll have soil conducive to planting.

Winterizing Your Soil



We all like to snuggle up under a warm blanket during the winter. Your garden plot feels the same way you do. It prefers to be covered with a blanket of organic material over the winter.

We covered one way to do this in the previous section. Lay down a thick layer of organic material, wet it down and let it sit over the winter. By the time planting season comes around, you'll have rich, workable soil.

Cover Crops



Another good way to winterize your garden is to plant what's called a *cover crop*. This is a crop of plants that grows in cold-weather. Cover crops aren't grown for the benefit of the farmer; they're grown for the benefit of the land. Come spring, cover crops are cut down and tilled back into the soil.

Cover crops help to regulate soil temperatures. This allows life to continue to thrive in the soil through the harsh winter months. They prevent erosion and cracking and hold weeds at bay. They also help

control pests and plant diseases.

Another benefit of cover crops is they eat up nitrogen and nutrients that would otherwise be washed out of the soil during the rainy season. They hold it until you turn the cover crop over, at which time they decay and release the nitrogen back into the soil.

The best part about cover crops is they're easy to plant and care for.

To plant a cover crop, all you need to do is work the area with a rake, throw down handfuls of seed, and then rake the seeds into the soil. Some people don't even bother with the last step, but I've found the birds end up eating a lot of the seeds if I don't rake them in.

Cover crops need to be planted at least a month before the first frost sets in. The only exception to this rule is cereal rye, which can be planted right before the first frost.

Cover crops are as close to set-and-forget as you can get.

Fast-growing cover crops may need a good mow or two before it's all said and done. If you're planting cover crops in between rows of plants or flowers, keep them trimmed back to prevent them from crowding out your plants. You may also need to water your cover crops occasionally if you live in an area that doesn't get much water. If your cover crops are starting to wilt, water them to ensure their longevity.

When the cover crops start to flower or seed heads start to emerge, it's time to kill them off and turn them under. You kill the plants by mowing them or trimming them as close to the ground as you can get. Wait a couple days for the plants to dry a bit, then till them under.

It's important that you turn your cover crops under at least three weeks before you plant. When the cover crops begin to decay, nitrogen will be pulled from the soil. It'll be released back into the soil in the later stages of decomposition, so it's important to wait it out.

You can plant cover crops with frost-resistant crops if you plan on growing produce in the winter. Let the produce grow for a few weeks before planting cover crops in between your rows of produce.

There are a number of cover crops you can plant. Here are some of the more popular crops:

- **Annual ryegrass (pictured above):** This hardy grass grows roots through the hardpan cover to soak up hard to reach nutrients. It creates channels into the hardpan which crop roots can follow when they're planted in the spring.
- **Buckwheat:** Grows fast and shades out weeds. The flowers are pretty, so it's a good choice to plant between

flower arrangements in a garden. Don't let buckwheat go to seed or it'll grow interspersed into your crops.

☐ **Cereal rye:** Cereal rye can be seeded late in fall. It grows fast in cool, temperate zones and does a good job of soaking up unused nitrogen and storing it away until spring.

☐ **Clover:** There are a number of types of clover you can plant as a cover crop. It all locks in nitrogen and enriches the soil.

☐ **Field peas and oats:** While either field peas or oats could be used as a cover crop, the two work best when used in conjunction with one another. The peas suck up nitrogen and lock it away until spring, while the oats grow fast and will provide ample organic material when they're turned over. They die off in colder climates, which will allow them to be turned under sooner so you can start planting earlier.

☐ **Grass:** Grass holds the soil in place and grows quickly, which helps create a large amount of organic material. If it gets out of control, mow it to 6 to 8 inches and leave the clippings on the plot.

While cover crops are a great way to get your soil ready for a long, harsh winter, they don't have to be limited to the winter season. You can plant cover crops between planting seasons year-round to reap their benefits. You can also plant cover crops between rows of other crops. Be sure to provide enough water to keep them healthy and leave some space between cover crops and whatever else it is you're growing.

The Living Earth



Good soil is teeming with microscopic organisms.

Up to 10 billion bacteria can exist in a single tablespoon of soil. Lay the mold fibers out end-to-end and you'd have a filament that's more than 100 meters in length. You'd also find millions of other microorganisms roaming around.

While bacteria and mold are usually frowned upon inside your home, they're your friend in the garden. They consume and digest nutrients, then spit them out in a form plants are able to absorb. They also regulate the flow of nutrients to plants by consuming some the nutrients and holding onto them until they die.

Organic matter feeds the soil in a way chemical fertilizer fails to do.

Microorganisms can't subsist on the substances contained in chemical fertilizers. They need a constant influx of organic matter to thrive. It's up to you to add organic matter to the soil at the beginning of each

growing season. You need to add a bare minimum of two inches of organic matter to your soil before tilling and planting.

This is an ongoing process because the organic matter is consumed by the microorganisms in the soil. It's just like feeding livestock; only the livestock you're feeding the organic matter to are invisible to the naked eye.

The following microorganisms may be present in your soil in varying levels:

□ **Bacteria are abundant in healthy soil.** There are many different species of bacteria. Some are good, some are bad, some serve no real purpose when it comes to the health of your garden. Bacteria help decompose dead plant matter and they soak up the nutrients being released, eventually releasing them back into the soil.

□ **Fungi spread out with tendril-like arms that bind soil particles together.** They eat the organic material left behind by bacteria. Some species of fungi are helpful to plants, while others can wreak havoc on your garden. Mycorrhizal fungi spores link with the cell walls of plant roots in order to exchange nutrients with the plant. The plant gives the sugar to the fungi in exchange for other nutrients the plant needs.

□ **Protozoa eat bacteria.** They release the nutrients stored in bacteria back into the soil in a soluble form that's easy for plants to absorb and process. They also help aerate the soil by creating small passageways.

□ **Nematodes are small wormlike creatures that protect your plants from disease and release nutrients into the soil.** Root-eating nematodes are bad nematodes—at least as far as your garden is concerned—that feed on the roots of plants.

You can ensure your soil has a thriving community of microorganisms by either making your own compost or buying compost that's made from local soil and adding it to your soil. Good compost that's been properly cultured will add life back into barren soil.

Soil Testing



A *soil test* can be performed to give you an idea of the nutrient health of your soil. When a soil test is performed, you collect a sample of your soil and send it off to a lab where it's tested for any combination of the following four items:

- ☐ **Contaminants**
- ☐ **Microorganisms**
- ☐ **Nutrients**
- ☐ **pH balance**

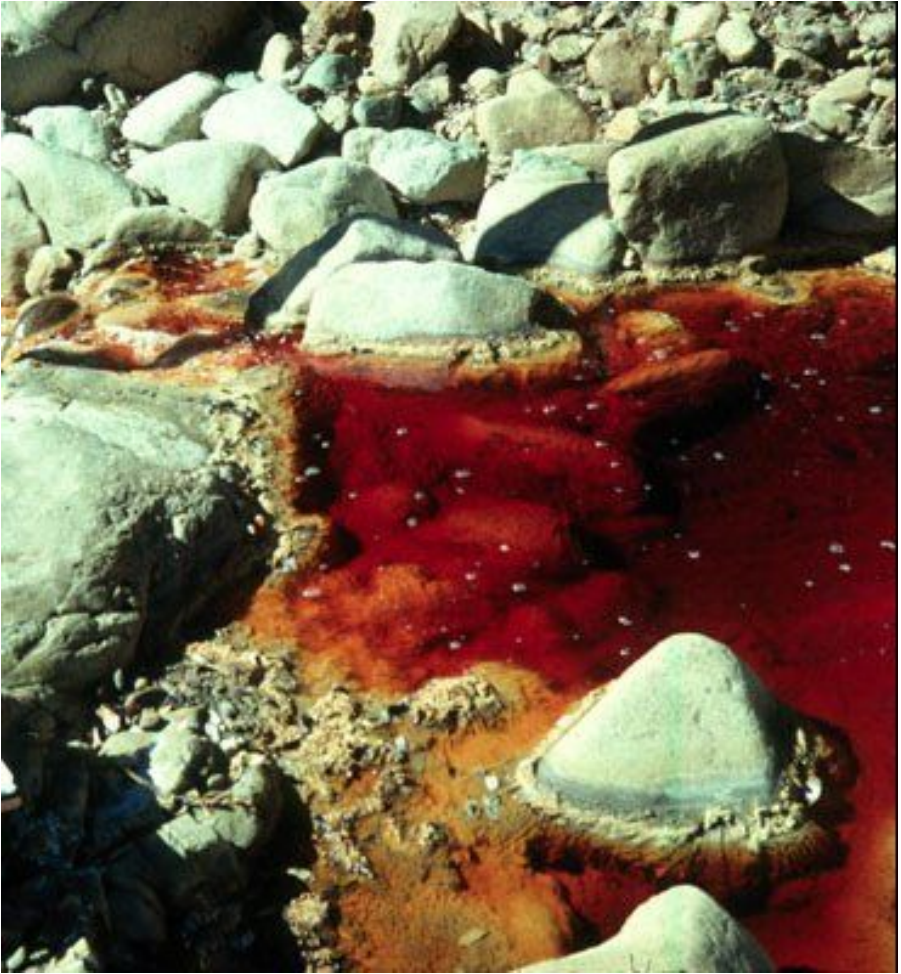
Soil testing allows you to check new ground which you're planning on gardening for the first time to identify potential problems ahead of time. It also allows you to troubleshoot problems you're currently having instead of trying to guess what's going on.

When you gather soil for a test, you need to gather it from the top of the soil to the depth of the roots of your plants. If you aren't sure, gathering soil down to 10 to 12 inches should cover most garden plants. If you're gardening a large plot, it's a good idea to take soil from multiple areas.

Biologic testing identifies and counts the microorganisms living in a

soil sample. This type of soil testing is relatively new and there isn't enough known about the interaction between the various types of microorganisms to make an informed decision based on one of these tests. I don't recommend paying for a biologic test at this time.

Contaminant Testing



You don't have to live next to a nuclear waste dump to be concerned with soil contamination. Heavy metals, petroleum product, mining residue and even airborne particles from pesticides or heavy vehicle traffic can all pollute soil.

Home sites near or on former military installations, mines, farmland or industrial areas are particularly at risk of contamination. Contaminants can reside in soil for hundreds of years, so don't assume you're safe because it's been decades since your land was used for other purposes.

Foods grown in contaminated soil can soak up large amounts of contaminants.

They're silent killers because they often look healthy, but contain

harmful levels of toxins. You won't know you've been ingesting toxins until you start to show signs of illness. It can take years to find the source of contaminant poisoning, if it's ever determined at all. You could potentially fall ill and never figure out the reason if you don't have your soil tested.

Soil contaminants aren't just harmful to your crops; some are so potent simply coming in contact with contaminated soil can do you harm. Pesticides, herbicides, lead, mercury, uranium, industrial solvents, petroleum byproducts, toxic waste. The list goes on and on. All can found in soil and you'll never know if you don't get your soil tested.

While at-risk areas are more likely to be contaminated, ground water and even rain can carry toxic substances away from contaminated sites to other areas. At a bare minimum, you're going to want to have your soil tested for heavy metals.

Dependent upon the type of test and whether your local or state government offers low-cost soil testing in your area, a soil test will run you anywhere from \$10 to a couple hundred bucks. It's a small price to pay for peace of mind.

What to Do If Your Soil Is Contaminated

Short of digging out the contaminated soil and putting new soil in its place, there isn't a whole lot you can do to "clean" contaminated soil that won't break the bank.

Adding organic matter to contaminated soil can reduce the availability of contaminants to your produce as it grows.

The more organic matter you add, the fewer contaminants there will be available because organic matter bonds with the contaminants and locks them away. When adding organic matter, steer clear of leaf matter gathered from streets or highways because you may be adding contaminants into the mix instead of diluting them.

Another option is to create a raised bed to garden in.

Create a raised bed by encircling an area with cinder blocks, laying down landscaping fabric and filling it with dirt. Don't use treated lumber for your raised bed, as the chemicals in the lumber can further contaminate your garden. Fill the garden with a 50/50 mix of organic matter and soil. As soil blows away or erodes, add in organic material or additional soil. As long as you don't plant deep-rooting produce, your garden will probably be safe. It's a good idea to have the soil from your raised garden tested from time to time to make sure it doesn't get contaminated. If the source of contamination is airborne or local, like lead paint falling off a building or air pollution settling to

the ground, your new dirt will eventually get contaminated as well.

For soil contaminated with lead, you can add lime to the soil, which will make the lead unavailable to your plants as long as the pH of the soil is kept above 6.5. Phosphorous also makes lead unavailable. You can add clean soil to the contaminated soil to further reduce lead content. Soil with lead content above 200 ppm should not be used for gardening.

Nutrient Testing

Nutrient tests are the most common type of soil testing. They measure the levels of various nutrients required by plants to grow and thrive.

A nutrient test will run you from \$10 to \$50 in most areas. Your soil will be tested for some or all of the following nutrients:

- ☐ **Calcium**
- ☐ **Magnesium**
- ☐ **Nitrogen**
- ☐ **Phosphorous**
- ☐ **Potassium**
- ☐ **Sulfur**
- ☐ **pH balance**

A soil coring device can be used to remove plugs of soil for the sample. The more areas of your garden plot you have tested the better informed you'll be as to the overall health of your plot. Take a number of samples, mix them together and place a cup of the mixed soil into a plastic bag. Send the plastic bag full of dirt to the lab for testing.

Let the lab know what type of garden you're planning on planting when you send the test in. They'll send you back a report containing a list of the nutrient levels, along with a section explaining how to best manage your soil. The report should tell you how to add the nutrients you're lacking to the soil to improve the overall health of your garden.

Let's take a closer look at some of the nutrients your soil needs.

Calcium

Calcium helps maintain the chemical balance in your soil. It reduces salinity and allows water to penetrate the soil more easily.

Plants need a steady supply of calcium because they use it to build cell walls. Once calcium has been consumed and placed into a cell wall, it can't be reused. Plants lacking in calcium experience growth abnormalities, deformation and stunted growth. Cavity spots or brown spots on produce may be because of a calcium deficiency.

Soil can test high in calcium and still not provide enough to the plants growing in it. Some sources of calcium are insoluble and can't be absorbed into the roots of plants.

If you have a small area you need to treat, egg shells can be crushed

up and added to the soil. This method can be used to treat a small plot with only a handful of plants. Trying to treat a larger area with egg shells isn't cost-effective.

If you have a larger area with more plants and your soil is acidic, you can add lime to the soil. There are 3 common types of lime you can add to your soil:

- **Calcium Carbonate:** This type of lime slowly releases calcium, so it's not a good choice for adding calcium to your soil.

- **Calcium Oxide:** It's also called quick lime, because it acts on soil quickly. While it can quickly add lime to your soil, you have to be careful because it can harm existing plants (and you, if you aren't careful).

- **Calcium-Magnesium Carbonate:** Also known as dolomitic lime, this form of lime adds both magnesium and calcium to the soil. It works slowly, acting in a manner similar to calcium carbonate. It's not a good choice if you already have a high magnesium content because too much magnesium in the soil can cause issues.

For those with soil that's alkaline, lime isn't a good solution because you don't want to raise the pH of your soil any higher than it already is. Calcium sulfate dehydrate, also known as gypsum, can be used on alkaline soils. It serves a dual purpose, as it lowers the pH and adds calcium.

Magnesium

Magnesium is a key ingredient used in the photosynthesis process and helps plants metabolize energy. Healthy soil has a calcium to magnesium ratio of about 7 to 1.

Epsom salt can be added to your soil to up magnesium content without changing the pH balance.

Calcitic or dolomitic lime can also be added to acidic soil to lower the pH and add magnesium. Calcitic lime contains a small amount of magnesium and can be used to make minor adjustments to magnesium levels. Dolomitic lime is a good choice when your soil shows a huge deficiency in magnesium.

Nitrogen

Every living cell on the planet contains nitrogen. It's essential for plant health and growth. Having enough nitrogen in the soil increases seed

and fruit production and improves the quality of most crops.

Adding high-carbon organic matter like sawdust to soil can remove nitrogen from the soil. The organisms in the soil use nitrogen to break down carbon compounds, which robs the nitrogen from the soil.

Nitrogen can be added back into the soil by adding mulch made from grass clippings, manure or by adding organic material to the soil. Planting legumes as a cover crop is also a good way to add nitrogen to the soil because legumes pull nitrogen from the air and impart it to the soil.

Phosphorous

Phosphorous is used in the *photosynthesis* process, in which plants turn solar energy into chemical energy. Phosphorous encourage root growth and is a key component in blooming.

Phosphorous can be added to an organic garden in the form of *bone meal*, which is an organic fertilizer made from crushed bones.

Potassium

Potassium is also used in photosynthesis. It's essential for plant growth because it helps with the creation of proteins. Plants lacking in potassium have stunted growth and leaves that curl at the tips. They are more susceptible to disease and damage from inclement weather and wind.

You can add potassium to your soil by adding organic fertilizer containing bone meal, blood and fish. Wood ash can be added directly to your soil to add small amounts of potassium at a time. Dried manures also contain small amounts of potassium.

Seaweed meal or liquid seaweed is an expensive option, but it contains 2% to 2.5% potassium and can be used for a quick fix when nothing else seems to work. Another quick fix is rock potash, which contains more than 10% potassium.

Sulfur

Sulfur is used by plants to proteins, enzyme and vitamins. It helps plants shield themselves from cold weather and allows them to grow bigger and stronger. It's rare to find soil that's lacking in sulfur because it's imparted to the soil by rainwater.

Elemental sulfur can be added to soil when it needs a sulfur boost. There is also some sulfur content in gypsum.

pH Balance

The pH balance of your soil is a measurement of whether your soil is acidic or alkaline. You can send your soil samples out for testing or you can purchase a home pH kit and test your soil yourself. Sending your soil out for testing will give you a more accurate picture of the pH level of your soil.

pH is measured on a scale of 0 to 14, with numbers less than 7 indicating increasing levels of acidity and numbers greater than 7 indicating increasing levels of alkalinity. A measurement of 7 is considered neutral.

The U.S. Dept. of Agriculture (USDA) assigns the following classifications to soil pH ranges:

~~pH~~ Classification

Ultra acid	<3.5
Extreme acid	3.5-4
Very strong acid	4-5
Strong acid	5-6
Medium acid	6-7
Slightly acid	7-7.5
Neutral	7.5-8
Slightly alkaline	8-8.5
Medium alkaline	8.5-9
Strongly alkaline	9-9.5
Very strongly alkaline	>9.5

Most plants do best in soils that measure between 6 and 7.5 pH. This is the pH level at which phosphorous in the soil becomes soluble. That said, plants are highly adaptive and will grow in soil outside of their optimum pH level.

Acidic Soil (Soil With <7 pH)



The following factors are considered contributing factors to soil acidity:

- ☐ **Organic matter that's acidic in nature breaks down in the soil, eventually making the soil acidic in nature.**
- ☐ **Rainfall or irrigation leaches potassium, magnesium and calcium from the soil.** The presence of these nutrients keeps soil from becoming too acidic.
- ☐ **Rainfall adds acidity to the soil because it has a high acid content.**
- ☐ **Ammonia-based synthetic (read non-organic) fertilizers contribute to acidity.**

Here's a non-scientific method you can use to keep an eye on the acidity of your soil. If you live in an area where dandelions or nettles grow—which is in most of the United States—keep an eye out for them to start sprouting up. This indicates your soil may be acidic because they thrive in acidic soil.

If your soil is acidic, all is not lost. You have a number of options.

You can take the easy way out and plant fruits and vegetables that thrive in acidic soil like blueberries (4 to 5 pH), kiwifruit (5 to 6 pH), huckleberry (5 to 6 pH), crabapple (5 to 6 pH) and potatoes (5 to 6

pH). Another option is to plant fruit trees. Apple, cherry, peach and pear trees can all grow fruit in soil with pH as low as 5.8.

So what can be done if you don't want to be limited to the aforementioned fruit and vegetables?

The good news is it's fairly easy to bring your pH balance up to normal levels. Adding lime is probably the easiest way to bring the pH of your soil back up. If you want to increase your soil's pH by one level, spread 7 to 10 pounds of lime per 100 square feet.

You aren't going to be able to spread lime one time and then forget about the pH of your soil. Rain will continue to lower your pH levels, so you'll have to keep adding lime as the soil needs it.

In order to get the exact amount of lime needed for your soil type, you should send your soil out at least once a year to be tested and follow the instructions on the report you get from the test center. Clay soil will be more difficult to adjust, so you may need to add more than amount mentioned above.

Compost can be added to soil to slowly and naturally bring up the pH balance. The effect won't be immediate, but it will slowly improve it over time. A good rule of thumb is to add between 2 to 4 inches of compost and turn it under the soil right before growing season.

Wood ashes will also slowly increase the pH of your soil. Add 7 to 10 pounds of ash per 100 square feet of surface. Apply it after the growing season and turn it under so the wind doesn't blow it away.

Yet another option is bone meal, which can be used to raise pH and add calcium to your soil. It won't raise your pH by a lot and tends to raise it slowly, but it works well when minor adjustments over time are desired. Apply between 10 to 20 pounds of bone meal per 100 square feet for best results.

Alkaline Soil (Soil With >7 pH)



Alkaline soil isn't as common of a problem as acidic soil, which is a good thing because it's harder to remedy. Treating alkaline soil costs more money and takes longer than treating acidic soil.

The cheapest option is to not try to fix it at all and just plant alkaline-tolerant plants. Cauliflower, cabbage, celery, asparagus and beets can all grow in soil with pH of up to 8.

You can lower pH slowly over time by adding acidic organic matter to the soil regularly. Add layers of peat moss to your organic matter to further up the acidity.

Elemental sulfur can be added to the soil to lower pH. It can take months for the full effect to be seen, as the microorganisms have to convert the elemental sulfur to sulfuric acid before it lowers the pH level.

For a quicker fix, you can use aluminum sulfate. Aluminum sulfate works fast and is extremely effective, but you have to be careful because it can reduce phosphorous levels. Continuous usage over time can cause aluminum to build up to harmful levels in the soil.

If free lime or chalk is present in the soil, it's going to be extremely difficult, if not impossible, to treat. You can test a soil sample for free lime by adding vinegar to it. If it bubbles or fizzes, free lime is present in the soil.

Organic Fertilizer

While most organic gardeners would like to completely forget about using any type of fertilizer, the reality is most garden soil is severely lacking in one or more of the nutrients needs for plants to grow to their full potential.

Organic fertilizers can be used to condition the soil and to feed both plants and the microorganisms in the soil. While chemical fertilizers repel organisms and eliminate them from the soil over time, organic fertilizers do the exact opposite. They provide a food source for both microorganisms and larger organisms like earthworms, which keep the soil loose and aerated.

Chemical fertilizers are often full of toxins and have no place in an organic garden. You're putting what amounts to a chemical cocktail on produce you plan on eventually feeding to your family. As the chemical fertilizer unbalances the level of life in your soil, it's going to take more and more fertilizer to grow your plants. Eventually your soil will end up barren and difficult to farm.

When buying an organic fertilizer, it's important to be aware that the standards and labeling regulations are complex and you could be getting more than you bargained for. Look for fertilizers labeled as "natural organic" that have an N-P-K rating that adds up to less than 15.

When you use an organic fertilizer, follow the instructions on the container. Some of them are pretty potent and need to be watered down before use.

How to Save Time with Mulch



There's no denying the fact that gardening can be time consuming. Organic gardens often require extra care because you have to keep an eye on them for signs something's gone awry.

The best thing you can do to save yourself some time in your garden is to apply mulch to it.

Mulch saves you time in the following ways:

- ☐ **It discourages weed growth by preventing seeds from germinating.** Any weeds that do manage to make it through the mulch will be rooted in loose material and easy to pull. Add mulch can cut the time you spend pulling weeds in your garden by as much as two-thirds.
- ☐ **It fights off pests.** You'll spend less time on pest control.
- ☐ **It holds water and prevents it from evaporating out of the soil.** You'll spend less time watering.
- ☐ **It keeps the soil cool in the summertime and prevents it from freezing and thawing in the winter.** You

won't have to worry about plants being thrown from the soil due to heave.

☐ **Earthworms love organic mulch.** Your soil will be properly aerated.

☐ **It decomposes slowly, adding nutrients into the soil as it decays.** You'll spend less time adding organic matter to your soil to try to add nutrients.

☐ **It reduces soil erosion by blocking rain and water droplets from directly hitting the ground.**

☐ **It improves soil structure.**

Mulch provides a natural barrier between the ground and the elements.

There are two basic types of mulch: organic and inorganic. Organic mulches are made from living materials, namely plant and animal matter. Inorganic mulch consists of nonliving materials like plastic and gravel.

Organic Mulch



Organic mulch is made from organic compounds and is preferable in most situations.

To use it to fight weeds and provide nutrients during the planting season, lay down layer of organic mulch that's at least 4 inches thick. You want to make sure you pull any existing weeds before laying the mulch down so they don't grow up through the mulch.

Organic mulches tend to pull nitrogen from the soil as they rot. Spread a thin layer of bone or fish meal on the surface before laying down your organic mulch to offset the nitrogen being pulled from the soil.

Keep your mulch pulled back from the roots of your plants. It can cause root rot and may allow rodents and bugs easy access to the roots and stems of your plants. Mulch should be kept away from plants that are susceptible to slug and snail damage.

Pine Needles



Pine needles, also known as *pine straw*, smell good and decompose slowly, so they last longer than many other kinds of mulch. They're acidic in nature, but don't really leach much acid into the soil. They may marginally increase the acidity of your soil as they decompose, but the effects will be negligible.

Pine straw is rather expensive when purchased commercially. A better option is to find somewhere local where pine trees grow and collect your own. There will be plenty of easy-to-harvest needles on the forest floor.

Seed Hulls

The hulls of cocoa beans, buckwheat and cottonseed can be used as mulch. They are largely decorative and don't provide much by way of nutrients, with the exception of cocoa hulls, which are high in potassium.

If you have dogs, steer clear of cocoa hulls. They smell like chocolate and your dog might be inclined to eat them. If they contain theobromine, they are every bit as toxic to dogs as cocoa and can make them very sick if ingested. If you have dogs and want cocoa bean mulch, look for one that doesn't contain theobromine.

Processed seed hulls are expensive and are prone to blowing away in strong winds because they're light. If you're looking to keep your garden looking good and aren't worried about cost, they may be a

decent option, but everyone else should look to other less expensive forms of mulch.

Shredded Leaves and Grass Clippings



Shredded leaves are a nutrient-rich mulch that you can get free of charge. All you need to do is find a place where there are a lot of leaves and run a few piles of leaves over with a lawnmower with a bag attached to it. Your lawnmower will chop the leaves up and create mulch that's economical and easy to use.

For best results, let the leaves rot for a while before using them. Allowing them to rot for a few weeks will help prevent them from pulling too much nitrogen from the soil as they begin to decompose. In the later stages of decomposition, they'll begin releasing nutrients back into the soil.

Grass clippings are another great mulch you can make with your lawn mower. You might get strange looks from your neighbors when you offer to mow their lawn in exchange for being allowed to keep the clippings, but you'll get all the clippings you need if you ask around. Grass clippings are rich in nitrogen and work great in garden plots.

Straw



Straw made from grains like wheat, rye or barley is an inexpensive and easy-to-find option. The cost is minimal, so it's a good choice for large garden plots. It's commonly used to mulch strawberry gardens and vegetable plots.

There are a few problems inherent to straw mulches. The biggest issue by far is their flammability. They light up easily and a straw mulch fire will spread rapidly. It can also provide a home for field mice and other small rodents and is susceptible to being blown away in high winds.

Straw can contain seeds, both from the type of grass it was made from and from weeds that were growing in the straw field when it was harvested. Straw will contain less weed seeds than hay, so go with straw when you have the option.

Straw pulls nitrogen from the soil as it breaks down, so always combine it with organic material rich in nitrogen.

Wood Mulches



Bark mulches and wood chip mulches are made from a variety of hard and soft woods. Commercially sold bark mulch is generally made from pine, redwood, spruce or fir trees. Wood chips are made from all kinds of different woods.

Wood chips are an inexpensive form of mulch that can be obtained at an obscenely low price from local landscaping or tree-care companies. If you can find a company that regularly grinds up trees, you've found a source of cheap wood chip mulch. Some companies might even be willing to give it to you just to get rid of it. Even if they do charge for it, you'll pay a small fee for a truckload of mulch.

Bark mulches come in various sizes. Bark chunks are the larger pieces of bark used by landscapers for decorative purposes. Colored bark is the mulch of choice for those looking to add a colored accent or two to their projects. The problem with colored bark is the color doesn't last very long. It fades after just a season or two out in the weather. Bright or dark barks will see their colors fade away the fastest.

Bark granules or shredded bark is used to condition soil. They resist compaction and aren't very susceptible to wind erosion. Be aware some bark mulches may be toxic to budding plants.

Wood chip and bark mulches tend to have a high carbon to nitrogen ratio. What this means is nitrogen will be pulled from the soil as the wood chips begin to decay. Add nitrogen-rich organic material to the soil before you mulch with wood chips or bark mulch to offset the nitrogen that will be removed.

Avoid over-mulching when using wood-based mulches. You can choke

out shallow-root plants and cause root diseases on trees and shrubs. A light layer of mulch is all you need each year. Mix it into the previous years' mulch and you should be good to go.

Sawdust is a mulch made from the finely ground wood particles created while cutting wood. Sawdust acidifies soil as it decays, so it's a good choice if you're looking to lower the alkalinity of your soil. It's also a good choice if you're planting acid-loving fruits like blueberries.

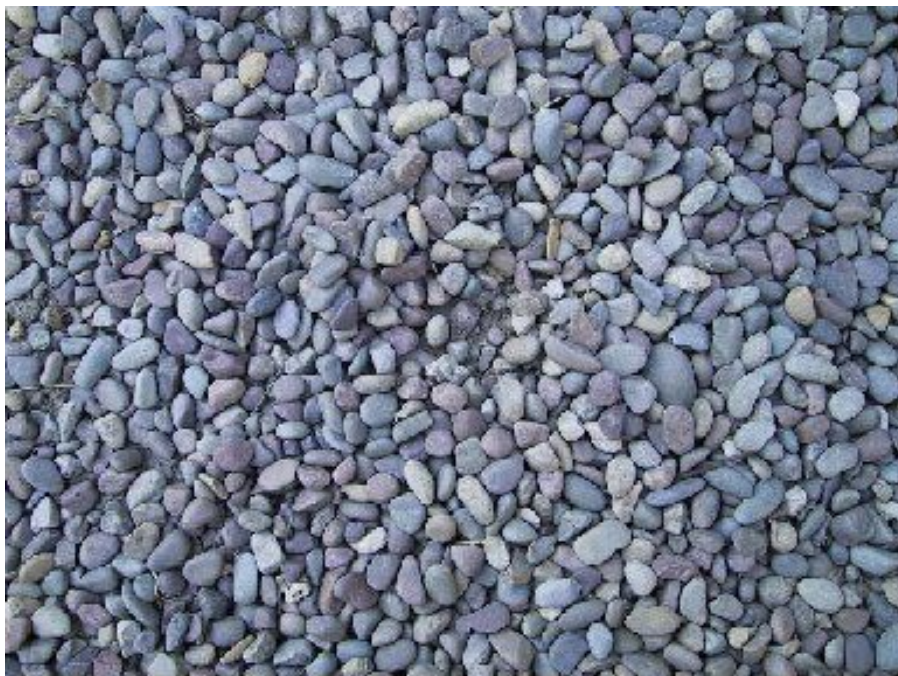
Wool



Wool mulch is a flexible mat that can be rolled out across large areas of soil. It's a good choice for those who live in an area that gets a lot of rain because it soaks up excess water and goes a long way toward preventing root rot from overwatering.

It may not be a good choice for arid climates where you want as much water as possible to reach the soil.

Inorganic Mulch



Inorganic mulch offers the same benefits as organic mulch, with the exception of adding nutrients into the soil. The good news is it doesn't leach nutrients from the soil either, so worries about nitrogen being removed are nonexistent.

Inorganic mulch doesn't decay at the same fast clip as organic mulch does and doesn't need to be replaced as often. It's a cost-effective choice for mulching, as long as you aren't worried about the fact that it doesn't add organic nutrients to your garden plot.

One concern with certain types of inorganic mulch is the fact that they may be made of a synthetic material. Mulches made of rubber or plastic materials may not be a good choice for those looking to keep their garden entirely organic, as they're made using petroleum products and the manufacture of them adds pollutants into the environment.

We're going to discuss them here, because use of them is common in organic gardens. It's up to you to decide whether the benefits outweigh the negative points.

Crushed Glass



Crushed glass that's been washed and tumbled can be used as mulch. It's aesthetically pleasing and can be used when you want attractive mulch that helps knock down weed growth.

One warning. Don't use this mulch in areas you plan on mowing. Broken glass projectiles are almost never a good thing.

Crushed Pebbles & Gravel



Mineral mulches create an environment that looks good and isn't conducive to weed growth. They can be colored to blend in with almost any environment.

Limestone chips can be used in acidic areas to raise the pH.

Be careful using crushed pebbles or gravel in areas that will be mowed. They can become projectiles when run over by a lawnmower. They also tend to sink into soil, so they'll need to be replaced over time. This can lead to extremely rocky soil if use continues over a long period of time.

Landscape Fabrics



Landscape fabrics, also known as geotextiles, are polyester or polypropylene-based fabrics that are laid down in sheets. They cancel out weed growth, keep water in the soil and are permeable enough to allow fertilizer and water to pass through to the soil.

You lay down the fabric, and then cut slits into it wherever you want to plant something. It's also possible to plant your garden first, then to lay down the fabric and cut slits in it as you go, working the fabric down over the plants.

They will break down over time, so you'll find yourself replacing them every couple of years.

Landscape fabrics are commonly used beneath other forms of mulch. A common application is to lay down a layer of landscape fabric over the soil, and then cover it with gravel, tumbled glass or bark.

Plastic Mulch



Plastic mulch is usually a single sheet or sheets of plastic laid down side to side so as to not allow moisture to escape from the earth. It's also used to prevent weeds from growing in areas that weren't planted.

Black plastic mulch reflects heat and prevents the ground from getting overly warm in hot climates. The downside is it can increase the time it takes for cold ground to thaw out and warm up.

Clear plastic has the opposite effect. It allows the heat of the sun to warm up the earth beneath it and traps the heat in. It can be laid over weedy areas to kill off both the weeds growing there and the seeds.

Red plastic mulch has proven effective in increasing the yield of both strawberry and tomato harvests. The red plastic reflects light back to the growing plants and triggers rapid development of a growth protein called phytochrome.

Green plastic stimulates growth in both melons and cucumbers.

No matter what type of plastic mulch you're using, it isn't going to last forever. Most plastic mulches can be reused a couple times, but will need to be replaced every couple years.

Recycled Rubber

Recycled rubber mulch is usually made from recycled tires. You're not limited to black; there are a number of colors available.

Rubber mulch doesn't biodegrade, so it never needs to be replaced. It doesn't soak up water and it's unlikely to blow away. It works well to control weeds as they aren't able to grow from rubber.

That said, rubber mulch isn't a good option for an organic garden. It leaches a number of contaminants into the ground, smells bad when it gets warm and if it catches fire, it belches toxic smoke into the environment and burns for a long time.

Compost: The Best Organic Material for Your Garden



Compost is decomposed organic matter that's rich in nutrients. It's one of the key components of organic gardening. Compost is the best way to add organic material and nutrients to your soil.

The best compost is made at home using materials native to your area. When you compost at home, the following four items have to be present in order to make good compost:

1. **Carbon:** As carbon oxidates, it produces heat, which is critical for decomposition.
2. **Nitrogen:** Feeds the microorganisms that oxidize the carbon.
3. **Oxygen:** Also needed to oxidize the carbon.
4. **Water:** Keeps the decomposition process moving along nicely.

When all four of these items are present in the right amounts, good compost will be created. It's not the easiest thing to get right, but it isn't as difficult as some people try to make it.

Take a deep breath and relax. You're about to learn how to make good

compost.

There are a number of composting methods. Here are three of the more popular methods:

- **Anaerobic composting.** Composting without air. All you need to do is layer a bunch of stuff in a big pile and wait a year or two for it to decay. It's the easiest form of composting as long as you have the time to wait it out.
- **Aerobic composting.** This is the type of composting described in the rest of this chapter. You add green and brown materials to a compost pile and turn it regularly to keep oxygen flowing into the pile. It speeds up the process so it only takes months instead of years.
- **Vermicomposting.** Composting with bugs. Red worms are the most common bug used in vermicomposting. They break organic material down and turn it into compost.

How to Make Compost



There are a ton of different methods of composting. The last time I wrote something about composting I got a bunch of letters and e-mails telling me I was doing it all wrong. Then, the person who sent me the letter went on to explain a different method of composting.

If you already know how to compost, you're a step ahead of the game. You may already have your own mix of organic matter that you use. There's no single correct way to create compost. It all boils down to adding organic material to a *compost pile* and creating prime conditions for it to decay.

The Compost Bin



The first thing you're going to need is somewhere to store your compost while it decays. Enter stage left the *compost bin*.

You can use any container you want as a compost bin. You can buy one, which will run you anywhere from twenty bucks on up into the thousands of dollars, dependent upon how big the bin is and what features it has, or you can make one, which is fairly inexpensive and easy to do.

Here's a quick and easy tutorial on how to make a compost bin from a plastic garbage can:

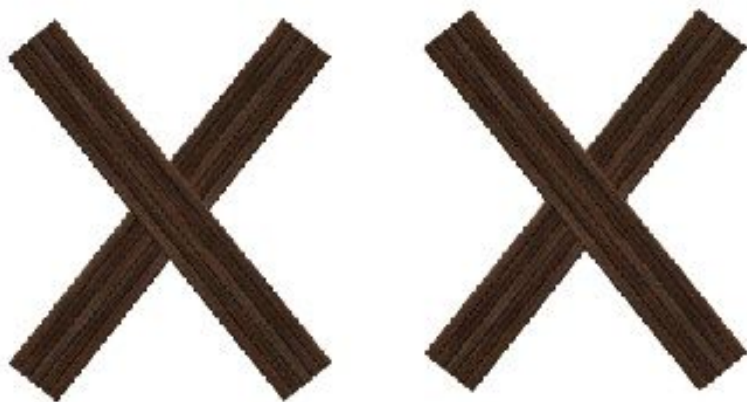
1. Get a plastic garbage can. The size of the can is up to you, but the bigger cans will be able to hold a lot more compost. I prefer a 64-gallon can or larger.
2. Drill 15 to 20 holes in the bottom of the can.
3. Drill 10 to 20 holes in each side of the can.

That's it. You now have a compost bin you can use to create compost.

If you use a round garbage can, you can use it as a *compost tumbler*. A tumbler mixes the compost up so it more effectively decomposes. All you need to do to mix up the compost is to secure the lid onto the round can with bungee cords and roll the can around a bit to mix up the decaying matter.

Tutorial: Make Your Own Compost Tumbler

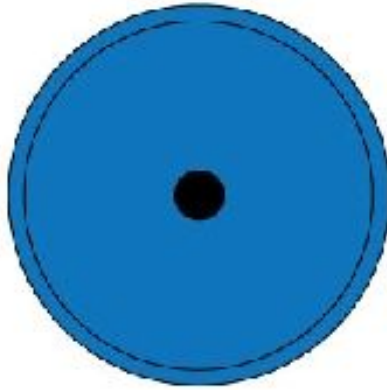
If you really want to get fancy, you can make a tumbler from a plastic drum that you can spin in place. Here's a tutorial for making a plastic compost tumbler:



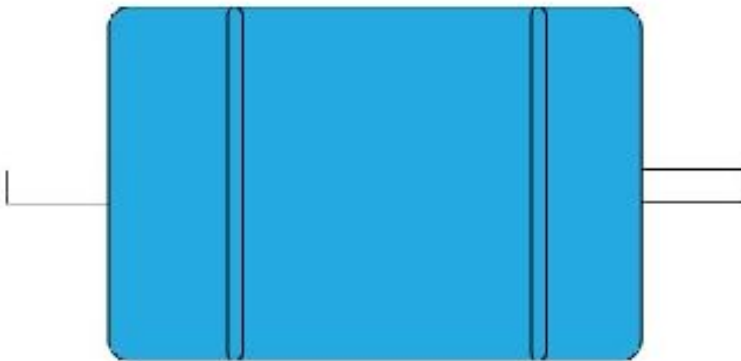
1. The first step is to create a holder for the compost bin. Cut four 2 x 4's to make the legs. Nail them together so they form an X as shown in the picture above.



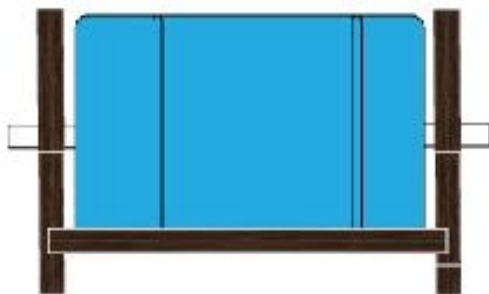
2. Measure the width of the plastic drum you plan on using as a tumbler and create a couple crossbeams that are a couple inches longer than the tumbler. Nail them to the X-braces you made in step one. This will create the frame onto which you place the tumbler.



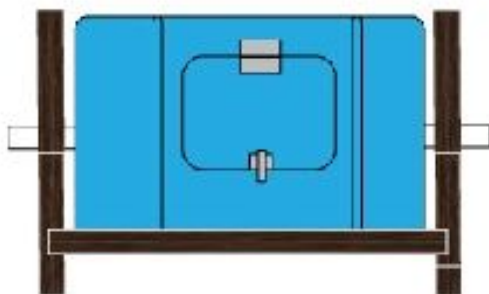
3. Now it's time to create the tumbler. Drill a hole in the bottom of the can as close to the center as you can get it. Flip the can over and drill a hole in the same place on the other side.



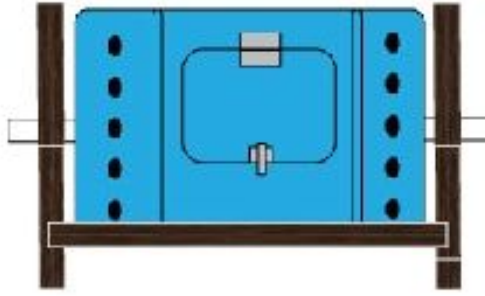
4. Insert a piece of PVC tubing through the holes you drilled. The tubing should be cut long enough so that it extends approximately 6" from the hole on each end.



-
5. Place the tumbler into the holder.



-
6. Cut a hole into the side of the canister. Create a door by attaching a hinge. Add a latch that will hold the door closed while you spin the tumbler.



-
7. Drill holes every 4" to 5" for aeration.

Congrats! You now have a compost tumbler. All you need to do now is add organic material and give it a few spins a couple times a day.

The Best (and Worst) Materials for Composting



Once you start composting, you're going to find yourself questioning everything you throw away. Should it be tossed or added to the compost bin? Adding the right items will ensure you have a happy and

healthy group of thriving microorganisms living in your compost bin. The wrong items can throw off the balance and cause all sorts of problems.

The following items are good items to add to a compost bin:

- ☐ **Coffee grounds.** They are high in nitrogen. Check with your local coffee shops, as they may be willing to provide them for free.
- ☐ **Dead or dying houseplants.** OK to add to your compost bin, but make sure they aren't diseased. You don't want to introduce new diseases to your organic garden plot.
- ☐ **Eggshells.** Don't throw out your eggshells. They add calcium into the compost.
- ☐ **Fresh grass clippings.** Only use grass grown organically. If pesticides or herbicides are used on the grass, don't add the clippings to your compost bin. Combine green grass with plenty of dried brown compost materials in order to avoid a smelly mess.
- ☐ **Freshwater aquarium algae, plants and water.** These items are high in nitrogen.
- ☐ **Garden debris.** Corn stalks, dried plants and dried vines can all be added to the compost heap. Plant trimmings can also be added.
- ☐ **Hay and straw.** Use seedless hay for best results. You don't want a crop of hay sprouting up in your garden. Straw decomposes slowly and contains a lot of nitrogen.
- ☐ **Leaves.** Leaves are full of nutrients and carbon. You can bag them up and set them aside so you have enough leaves to last you through the following summer.
- ☐ **Manure.** You can compost chicken, sheep, horse and cow manure.
- ☐ **Newspaper.** Newspaper can be added in a pinch if you don't have enough brown material handy.
- ☐ **Seaweed.** Seaweed is clear full of nutrients. If you live by the beach and can get seaweed, it's a great addition to your compost pile.
- ☐ **Tea bags.** Adds nutrients to the mix.
- ☐ **Vegetable scraps.** If you peel vegetables, you can throw the peels and scraps into the compost bin.

☐ **Weeds.** Yes, you can get rid of the weeds you pull by adding them to your compost bin. Be careful not to add weeds with seeds that could sprout when you spread the compost.

☐ **Wood ashes.** Wood ash in small amounts can be beneficial because it adds potassium. Don't add too much because it can really up the alkalinity of your soil.

These aren't the only items you can add to your compost bin. These are just some of the best items. Add them if you've got them.

The following items shouldn't be added to your compost heap:

☐ **Animal matter.** Meats and fats can result in the growth of harmful bacteria. It can also attract unwanted attention from meat-eating animals, rats and insects.

☐ **Human and pet feces.** Can contain dangerous bacteria.

☐ **Inorganic trash.** It won't break down and can wreak havoc on the delicate balance in your compost bin.

☐ **Mature weeds with seeds.**

☐ **Oak leaves.** High in acid and tannin. Take a long time to decompose.

☐ **Seeded hay.** Hay with seeds is a bad idea because the seeds can take root and sprout when you spread the compost in your garden.

☐ **Walnut leaves.** Contain chemicals that can retard the growth of some plants.

☐ **Waxy leaves.** Take too long to decompose.

☐ **Wood that's been treated with chemicals.** This includes pressure-treated woods.

Creating Your First Batch of Compost

This is the part of composting that most people hate. You're going to have to do a bit of math to figure out how much of each type of item you need to add to your compost bin.

Every item you add to your compost bin is going to have a certain level of carbon and a certain level of nitrogen. This is called the *carbon:nitrogen ratio (C:N)*. An item that has 30 parts carbon to every one part nitrogen is said to have a 30:1 C:N ratio. The microorganisms in your compost pile will consume 30 units of carbon for every 1 unit of nitrogen consumed. A 30 to 1 C:N ratio is what you should shoot

for in your compost pile.

The following chart shows the carbon ratios for various items you might want to add to your compost heap. It also lists whether they're considered green or brown items, which we'll talk about later on in this section.

Carbon Ratio Brown

7:1 Chicken manure

20:1 Coffee grounds

10:1 Cottonseed meal

13:1 Cow manure

1:1 Dried blood

45:1 Eggshells

25:1 Grass clippings

60:1 Green if fresh, Brown if dry

15:1 Legume hay

20:1 Legume hay

25:1 Lawn clippings

30:1 Lint

50:1 Lumber

5:1 Sheep manure

25:1 Shredded paper, newspaper or cardboard

80:1 Sawdust

15:1 Vegetable peels

25:1 Woodchips

Keep in mind this chart only *estimates* what your C:N ratio is going to be. You can use it as a rough guide to get you in the right ballpark. Fruit waste is estimated at 45:1 on the chart, but the reality is varying types of fruit waste have varying C:N ratios. If you're a perfectionist, you can send the items you want to add to your compost bin away to be tested to get exact measurements, but it really isn't necessary.

Say you want to add 1 part leaves, 1 part dried blood and one part cottonseed meal to your compost bin and are wondering what the C:N ratio is. You're adding 75 total parts carbon and 3 total parts nitrogen. Divide 75 by 3 and you have 25 parts carbon for every 1 part nitrogen. Not bad, but not exactly the 30 to 1 ratio that's ideal.

You could add 1 additional part of leaves and 1 part of fruit waste to the mix to get the ratio to the proper level. You'd now be adding 1 part leaves at a ratio of 60:1, 1 part dried blood at 5:1, 1 part fruit waste at 45:1 and 1 part cottonseed meal at 10:1. This gives you a final ratio of 120:4, which breaks down to exactly 30:1.

Sounds rather difficult, doesn't it?

Well, if you're feeling lazy, you can probably get away with tossing a good mix of green and brown materials into the composter and stirring it occasionally.

Green items are high in nitrogen and will up the nitrogen level in your compost bin. If you don't have enough green items in your compost, it will decay very slowly. It can take *years* for a compost heap to decay if there aren't enough green materials. Green material is more often than not soft and wet.

Brown items are high in carbon and increase the carbon level in the compost bin. They prevent the compost from rotting too quickly and cut down on the smell. If your compost smells rotten or has an ammonia scent to it, you should add more brown materials. Brown items are usually dry and . . . well, brown.

Equal amounts of green and brown materials will get you pretty close to where you want to be regarding your C:N ratio. If you don't feel like calculating the C:N ratio of what you're adding to your compost, you can wing it and probably get along just fine.

Good compost generates heat. Warm compost is good compost. If it's steaming, you're probably good to go. Hot compost decays at a faster pace and kills off weeds and seeds in the compost. You want your

compost pile to heat up.

How to Solve Common Compost Problems

If there's one thing for certain about compost, it's that you're eventually going to experience issues. The good news is there aren't too many problems that can't be fixed by adding either green or brown material.

Here are some common compost problems and how to fix them:

□ **Compost that's too dry.** Dry compost is common in arid areas. Your compost should feel about as damp as a piece of cloth that you've wetted down and squeezed out. If your compost feels like a damp sponge, you're probably good to go. You can add water to compost that's too dry and it'll usually come back to life. Try turning your compost and adding water slowly for best results. Check it in a day or two to see if it's starting to warm up. If not, add a bunch of nitrogen-rich material to it and mix it up real good. Once you've got it going again, don't let it dry out. Add water as it's needed before you get to the breaking point.

□ **Compost that's too wet.** Compost with too much water in it will be cold, wet and slimy. If you have too much wet green material in your compost, it'll hold water and become too dense to allow oxygen to get deep into the compost pile. This creates an environment in which oxygen-consuming bacteria can't survive. The compost pile will continue to decompose because some bacteria will be present that don't need oxygen, but it will decompose at a much slower rate. To solve the problem of a cold, wet pile add light, dry brown material to the pile along with items that are high in nitrogen to fire the pile back up again. If you have an open compost pile that's exposed to the elements, you're going to have to figure out a way to cover it during the rainy season to keep it from getting too wet.

□ **Frozen compost.** Compost may freeze if left outside in areas that experience below-zero temps for weeks on end. You may have to wait until things warm up a bit or bring your compost inside a barn or garage where it's warmer.

□ **Animal attack.** Raccoons, rats, cats, deer, etc. There are all kinds of animals that are attracted to a compost pile. They don't eat the organic material, but they will dig through it to get fruit, vegetables and other greens. Cover your bin to

protect it from roving animals. You can also try spreading peppermint extract around (not in) the bin. A lot of animals don't like the smell of peppermint and will steer clear.

□ **Plants and weeds growing in the compost.** A hot compost pile should heat up enough to kill off any weed seeds in the pile. If there are plants growing in your compost pile, pull them, break them up and return them to the pile.

□ **Bugs!** Bugs are going to eventually find their way into your compost pile if it cools down to a level they can tolerate. Pill bugs, earwigs, sow bugs and even ants have all been known to form colonies in compost heaps. They won't do much harm to your compost, but you need to get rid of them before you spread it in your garden. To get rid of the bugs naturally, add nitrogen-rich materials, water your compost and turn it once a day until the bugs are gone. Once the temperature gets over about 115F the bugs will head for a more comfortable environment.

□ **Stinky compost.** Compost that smells of anything other than a rich, earthy smell has issues that need to be taken care of. If it smells rotten or reeks of ammonia, try stirring it up. Introducing oxygen to the center of the mix may be all it takes. If that fails, you may have too much nitrogen in the pile and need to add more brown material to the mix. You'll probably have to mix the pile up real good a few times before you start seeing results. Make sure you break up any chunks of wet green material.

□ **Shrinking compost pile.** This is a natural change as the organic material begins to decay. Keep adding green and brown material to your compost bin while removing the finished compost at the bottom of the pile.

Screening Your Compost

Some people like to screen their compost to get rid of stones, twigs and materials that haven't broken down yet. To do this, they run the compost through a *compost screener* to separate the good stuff from the bad.

A compost screener is a simple device to make. All you need to do is create a wood frame and attach a mesh screen to it. Place the screen over a wheelbarrow or container and push the compost through the screen to separate it.

The stuff that ends up in the wheelbarrow is the good organic

compost. The stuff that can't be pushed through can be tossed out or added back to the compost pile.

Deciding What to Plant

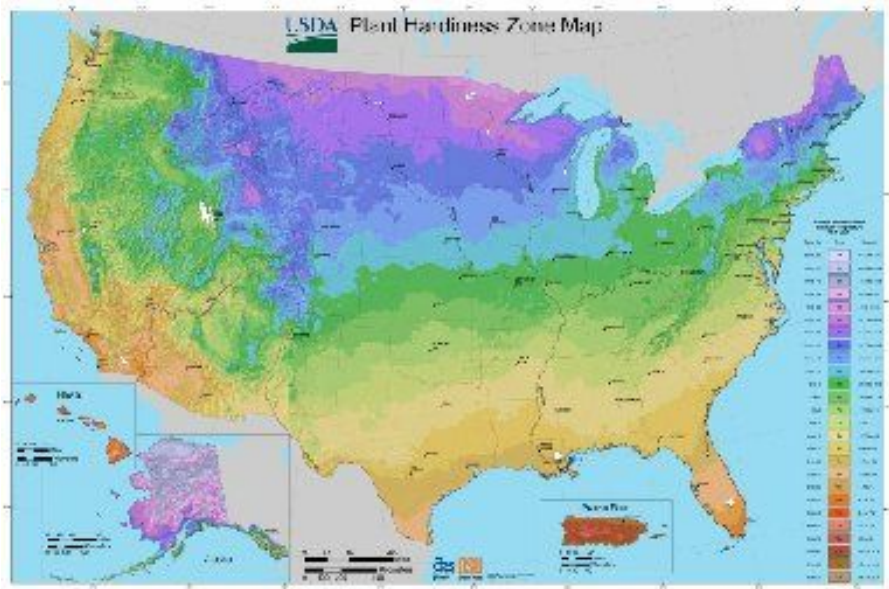
Picking what you want to grow in your garden is going to be one of the toughest decisions you're going to have to make. Plant the wrong items for your climate and soil type and you're going to have constant problems. Choose the right stuff and you're going to have a garden you can be proud of.

Budding gardeners should take a trip to their local garden center or nursery before planting anything. Talk to a few people first and see if you can locate an expert in the best items to plant in an organic garden in your area. A bit of expert advice can go a long way toward pointing you in the right direction.

You want to avoid plants that aren't going to thrive in the area you live in. Planting a plant that thrives in warm weather in an area that's cool most of the year will result in a plant that's stunted and unhealthy, if it grows at all. The same thing goes for planting a plant that likes the cold in a dry, warm area.

So how do you figure out which plants thrive in which areas? It's easy. All the hard work has been done for you.

USDA Hardiness Zones



USDA hardiness zones divide North America into 11 separate climate zones based on how cold the area is. I know the map above is small and hard to read, so here's a link to a bigger version you can view online:

USDA Hardiness Zone Map

Here's another link where you can enter your zip code and find the climate zone you live in:

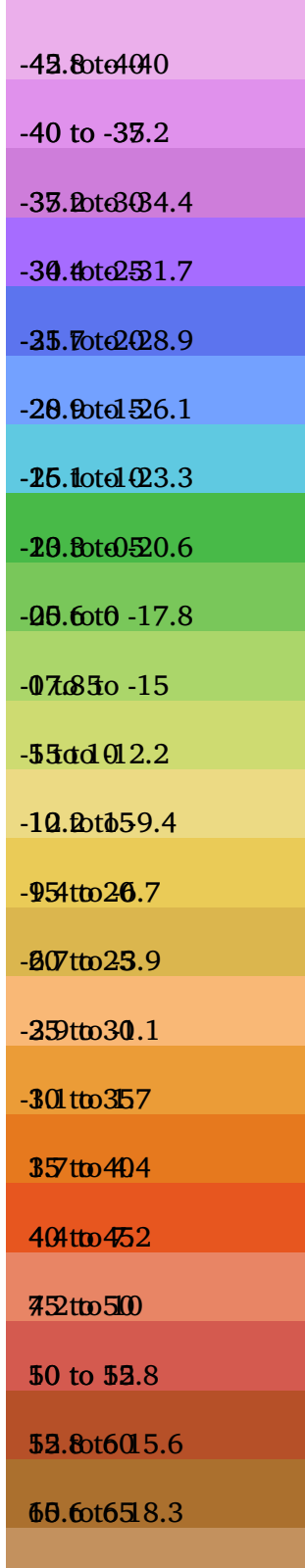
Interactive Hardiness Zone Map

You can also get Hardiness Zone maps for your individual state from this site.

There are a total of 16 zones, divided up by the average minimum temperature between 1976 and 2005. Here's the breakdown of the zones:

Temp (°F)

-50.1 to -54.3
-48.8 to -50.6
-46.6 to -42.8
-44.4 to -40.6



The Hardiness Zone Map was created to provide gardeners and farmers an easy reference point to determine which plants will grow best in their climate area. All you have to do is figure out which zone you live in, then check to see which plants grow best in that area.

Here are some zone-by-zone suggestions of plants you can grow for each zone.

Zone 1

Beans

Bell peppers

Broccoli

Cabbage

Celery

Corn

Crowberry

Lavender

Onions

Peony

Potatoes

Radishes

Roses

Sweet corn

Sweet peppers

Tomatoes

Zone 2

Basil

Beetroot

Borage

Carrots

Chives

Celery
Corn
Cucumbers
Cranberry bush
Garlic
Lettuce
Lilies
Peas
Plums
Potatoes
Rhubarb
Roses
Thyme
Tomatoes

Zone 3

Apples
Artichokes
Asparagus
Beans
Beets
Carrots
Celery
Chili peppers
Corn
Cucumbers
Kiwi
Lettuce
Lilac
Lilies
Onions

Petunias
Potatoes
Radishes
Roses
Russian olive
Siberian crabapple
Snap peas
Spinach
Sunflowers
Sweet peppers
Tomatoes

Zone 4

Apples
Apricots
Artichokes
Asparagus
Basil
Beans
Beets
Blueberries
Carrots
Celery
Chili peppers
Chives
Corn
Cucumbers
Grapes
Honeysuckle
Hydrangea
Kiwi

Lettuce

Lilies

Onions

Pears

Potatoes

Radishes

Roses

Spinach

Sugar maple

Sweet peppers

Tomatoes

Walnuts

Zone 5

Almonds

Apples

Apricots

Artichokes

Asparagus

Basil

Beans

Beets

Blackberries

Blueberries

Carrots

Celery

Cherries

Chili peppers

Chives

Corn

Cucumbers

Grapes

Kiwi

Lettuce

Lilies

Nectarines

Onions

Peaches

Pears

Plums

Potatoes

Radishes

Roses

Spinach

Sweet peppers

Tomatoes

Walnuts

Zone 6

African violets

Almonds

Apples

Apricots

Artichokes

Asparagus

Basil

Beans

Beets

Blackberries

Blueberries

Carrots

Celery

Cherries
Chili peppers
Chives
Corn
Cucumbers
Grapes
Kiwi
Lettuce
Lilies
Nectarines
Onions
Peaches
Pears
Plums
Potatoes
Radishes
Roses
Spinach
Sweet peppers
Tomatoes
Walnuts
Winter Irises
Zone 7
Almonds
Apricots
Artichokes
Asparagus
Basil
Beans
Blackberries

Blueberries

Broccoli

Carrots

Celery

Cherries

Chili peppers

Corn

Cucumbers

Grapes

Kiwi

Lettuce

Nectarines

Onions

Peaches

Pears

Plums

Potatoes

Roses

Spinach

Sweet peppers

Tomatoes

Walnuts

Zone 8

Almonds

Artichokes

Asparagus

Basil

Beans

Beets

Blackberries

Carrots

Celery

Cherries

Chili peppers

Corn

Cucumbers

Grapes

Kiwi

Lettuce

Mexican orange

Nectarines

Onions

Peaches

Pears

Plums

Potatoes

Radishes

Roses

Strawberries

Sweet peppers

Tomatoes

Walnuts

Zone 9

Artichokes

Asparagus

Basil

Beans

Blackberries

Bush cherry

Carrots

Celery

Chili peppers

Corn

Cucumbers

Daylilies

Grapes

Lettuce

Onions

Potatoes

Radishes

Roses

Spinach

Strawberries

Sweet peppers

Tomatoes

Tulips

Zone 10

Basil

Beans

Beetroot

Carrots

Celery

Chard

Chile peppers

Coriander

Corn

Cucumbers

Lettuce

Potatoes

Roses

Sweet peppers

Tomatoes

Zone 11

Avocado

Basil

Beans

Beetroot

Carrots

Celery

Chard

Chile peppers

Chinese pepper

Coriander

Corn

Cucumbers

Jasmine

Lettuce

Potatoes

Roses

Sweet peppers

Tomatoes

Tuberose

Wheat

Zone 12

Basil

Beans

Carrots

Celery

Chili pepper

Coriander

Corn

Cucumbers

Lemongrass

Lettuce

Onions

Oregano

Parsley

Tomatoes

Watermelon

Radishes

Zone 13

Alpine strawberries

Broccoli

Celery

Coffee

Coriander

Corn

Cucumbers

Guava

Passion fruit

Sunflowers

Sweet peas

Tomatoes

Keep in mind that this list is only a partial list of items people commonly grow in the various climate zones. There are a ton of variations of various plants, flowers, fruits and vegetables that have been created to live in climate zones outside of the zone(s) they're native to and there are other plants not listed because they aren't common.

Most seed catalogs and seed packages will tell you the climate zone the plant is supposed to be grown in. Websites that sell seeds are hit or miss. Some tell you and some don't.

Do You Really Need to Spend the Extra Money on Organic Seeds?



You'd think that in order to start an organic garden you'd need organic seeds. It only makes sense, right? I'm probably going to catch heat for this because there is a very vocal group of organic gardeners who strongly believe only organic seeds should be used, but here goes nothing.

You don't *absolutely have to* use organic seeds to grow an organic garden. You can plant regular seeds and grow your plants organically and end up with pretty much the exact same chemical-free produce when it's all said and done. Federal law requires that seeds that are sprayed with chemicals to be marked with colorful dyes. Avoid these seeds at all costs.

That said, my personal opinion is you should always use organic seeds when they're available, the reason being that you're supporting organic farming each time you buy a packet of seeds. You're making a statement with your pocketbook and are letting organic farmers know you support their cause.

While there aren't going to be large amounts of pesticides in the non-organic seeds you buy, you can rest assured the plants the seeds came from were treated with all sorts of harsh chemicals. If not, the seeds would be sold as organic seeds. These chemicals aren't good for the environment and I refuse to support companies that use them.

Buying organic seeds protects the environment and it protects the people who work on the farm where the seeds are harvested. Isn't that what organic gardening is all about?

Heirloom Seeds and Why They're Superior



Raise your hand if you've ever bit into a piece of fruit or vegetable and been shocked by its complete lack of flavor. If you've done much produce shopping at your local supermarket, you probably raised your hand. The reason for this is because the farming industry doesn't care about the flavor of the produce it's putting out so much as it cares about putting as much produce on supermarket shelves as possible.

Heirloom fruits and vegetables are the answer to those flavorless carbon-copies that look like fruit and vegetables until you bite into them. Heirloom fruit and vegetables come from seed lines that are at least 50 years old and have been passed down from family member to family member. They taste the way they're supposed to taste, not like a watered down version of the item they're pretending to be.

You've probably heard of heirloom tomatoes, as they're widely coveted for their rich flavor and are often available in supermarkets. Tomatoes aren't the only game in town. You can get heirloom seeds for pretty much any type of produce you can imagine.

There are a number of places you can get heirloom seeds. You can get them from small farms, local families with gardens or your local nursery. You can find them online, too. Here are a handful of my favorite sites:

Organica Seed

Baker Creek Heirloom Seeds

Seed Savers

Victory Seeds

Whenever possible, go with organic heirloom seeds. Your garden will be the better for it and you'll be able to sleep well at night knowing you're growing traditional produce that may date back as far as a hundred years or more. Talk about going back to your roots!

Deciding When to Plant



When it comes to planting your seeds or seedlings, you're going to want to decide when to plant them based on the zone you're in and the type of plant you're planning on planting. Some plants do better during the warm season, while others are cool-weather plants.

Warm-weather plants should be planted just after the last frost of the season. You can plant them in the summer as well, as long as they'll be ready for harvest before the last frost. Cool-weather plants should be planted in the late summer or fall. In extremely cold climates, make sure you plant your cool-weather plants so that they'll be ready for harvest before it gets too cold for them to survive. In mild climates, you may be able to grow crops year-round.

I know what you're thinking. You're wondering how the heck you can tell when you're experiencing the last frost of the season or are getting close to the first frost. The short answer is you can't really tell. The long answer is you can't tell for sure, but you can make an educated guess based on historical information.

Victory Seeds has a handy list of average first and last frosts on their website. Pick the state you live in, then pick the city closest to where you live to get a pretty good idea of when the first and last frost in your area is. Here's a link to the site:

[Average first and last frost dates](#)

You can use the links on the following site to help you figure out the planting schedule for various vegetables based on what zone you live in:

[Planting Schedules](#)

Make sure you give yourself plenty of time to grow and harvest your produce. If you only have a 90-day growing season and you want to plant something that takes 100 days to grow, you can get an early start by sprouting the seeds indoors early and letting them grow a bit in containers before you plant them. As long as you time it right, you'll be able to squeeze in under the 90-day outdoor growing period.

Starting Your Own Seeds



When you decide your garden is ready to plant, you have a decision to make. You can go the easier, more expensive route of buying plants that have already been sprouted and are ready to be put in the earth or you can do it the (somewhat) harder way by sprouting your own seeds.

By sprouting your own seeds, you open your garden up to a much wider variety of plants than you'd be able to buy already sprouted. You can order a wide variety of seeds from various catalogs and over the Internet. You'll be able to experiment a bit because seeds are relatively inexpensive.

Here's what you need to do to get your seedlings started from seed:

1. **Create your own starting soil by mixing 3 parts compost, 2 parts peat moss, 1 part perlite and 1 part vermiculite.** Dampen the ingredients and mix them thoroughly. You can buy starting soil at your local garden center if you want to skip this step.
2. **Add the soil to your *starting containers*.** These are the containers in which you're going to plant your seeds and nurse them to life. You can use pretty much any container you want. I like to use empty egg cartons because I can plant a couple dozen

or so seeds at once. I save the cartons as we empty them during the year and use them come sprouting time. Poke holes in the bottom for drainage. As long as you use cardboard egg cartons, you can cut the individual sections out and plant the entire carton.

3. **Plant the seeds.** Some seeds need to be planted just below the surface, while others need to be 5 to 10mm down in the dirt. Plant 2 seeds per container (3 if the seeds are small).

4. **Cover the containers with a couple loose wraps of plastic wrap.**

5. **Keep the temperature inside the plastic around 70°F.** If it gets too cold, the seeds won't sprout. You can up the temperature by placing the seed containers on a seed heating pad.

6. **Wait for your seeds to sprout.** It could take anywhere from a day or two up to a month depending on what kind of seeds you're sprouting.

7. **Once you see a sprout poking through the dirt, it's time to move the seed container containing that sprout under the lights.** You can use either fluorescent lights or grow lights. The sprouts need to be approximately 3 inches from the light.

8. **Keep the soil damp.** One way to do this is to place the seed containers in a tray and keep a thin layer of water in the tray. The water will leach up through the soil to the seedlings, keeping the soil around them damp, but not soaking wet.

9. **Watch your plants grow!** If the stems look weak or they aren't growing as fast as they should be, try adding a bit of fish emulsion to the top of the soil around the sprout. Dilute it to a quarter of its regular strength.

10. **When you see leaves start to bud out it's time to strengthen those stalks.** Place a small fan near your plants and let it blow on them around the clock.

11. **Once your seedlings reach 2" to 3" in height, it's time to thin the herd.** Some of your containers will have 2 or even 3 plants growing from them. Pick out the strongest-looking plant in each container, and then cut the rest of the seedlings off at the point where they meet the soil. You should only have one seedling remaining in each container when you finish this step. Don't pull them out by the roots because the roots of the seedlings you're getting rid of may be intertwined with the ones you want to keep.

12. Move the seedlings to larger containers containing soil made of 2 parts potting soil to 1 part compost. If you used cardboard egg cartons, you can cut out each tray and plant the whole tray. If you used non-biodegradable containers, you're going to have to turn the container upside down and gently work the entire chunk of soil out of the container so it can be planted.

13. Water your plants. The soil should be damp, but not soaking wet.

14. Put the plants back under the lights until you're ready to plant them.

15. One week before you plant them, start taking your plants outside and letting them sit for a few hours a day. This will get them used to being outdoors. Slowly work up to leaving them out all day. The process of moving plants outdoors this way is called *hardening off your plants*.

16. Once you're able to leave your potted plants out overnight, it's time to plant them. Pick a good spot in the garden (which you've already prepared using the soil preparation techniques discussed earlier in the book), dig a hole and plant your seedlings. They should be planted at the same depth they were in while in the container. Try not to disturb the roots as you remove them from the pot. Take as much soil with you as you can.

17. Congrats! You've successfully grown a seedling and planted it.

Saving Seeds for Next Season



Those using hybrid seeds can skip this section. Hybrids won't grow the same plants as the seeds you collected. They'll grow as one of their parent plants instead.

For everyone else, you can harvest the seeds from your biggest and best specimens so you can plant them next year. This allows you to create a master breed of plant over time as you select the best seeds time and time again.

People tend to overcomplicate seed harvest.

It's really not that difficult if you think about it. Without human interaction, the seeds would eventually be returned to the soil where they'd germinate on their own and sprout up the next growing season. All you're doing is collecting them so you can sprout them yourself. If anything, you're giving Mother Nature a helping hand.

Be aware that plants that are pollinated by insects may develop into plants that are hybrid in nature. You never know where the insects pollinating your plants have been and they can travel a long way before pollinating the plants in your garden. Growing different varieties of the same type of insect-pollinated produce in the same garden almost ensures your produce will be hybrid in nature. It's still edible; you just can't be sure of what you're going to get.

Let's look at some of the easier seed types to harvest and use year after year:

□ **Tomatoes.** Cut the tomato in half and squeeze out the seeds and juice. Add 1 part water to a bowl for every part tomato juice and seeds you have. Let it sit out and stir the mixture a couple times a day for a few days. Once it begins to mold and stink, add more water and stir the mixture up real good. The good seeds are heavy and should sink to the bottom. Pour off the mold and the water, along with any seeds that float to the top. These seeds are no good. Repeat the process until you have nothing left but clean seeds in the bottom of the bowl. Place the seeds on a glass plate and let them dry out in the open air. Don't put them in the oven, the microwave or in direct sunlight.

□ **Peppers.** These are easy to harvest. Cut the pepper open and scrape out the seeds. Place them on a glass plate and let them dry.

□ **Melons.** Cut your melon open and rinse off the seeds. Set them on a glass plate and let them dry. Wash the seeds from sugary melons like cantaloupe and watermelon with a mixture of water and dishwashing liquid to remove sugary build-up.

□ **Squash.** Cut down to the seed cavity, then run the knife around in a circle, opening up the squash without penetrating too deep into the seed cavity. Remove the seeds and dry them out.

□ **Let the cucumber ripen on the vine until it becomes soft.** Cut it open and scrape the seeds out. Scrub the seeds to remove the seed coating and dry them out.

□ **Flowers.** You can harvest seeds from most flowers by letting the flower dry up and fall off. A seedpod will grow in its place. Wait to harvest the seed pod until after it has dried up and started to crack open. Once it's dry, cut the entire pod off of the stem and let the seeds finish drying . The seeds should be completely dry before you remove them from the pod.

Once you've harvested your seeds, you need to put them away in a safe place until it's time to plant them. A simple paper envelope will do the trick. It's open and airy and won't cause the seeds to mold or otherwise go bad. Avoid storing them in airtight containers like film canisters, as condensation can build up and cause problems.

Keep your seeds in a cool, dark place. The fridge will work in a pinch if you don't have anywhere else cool to store them.

If you're planning on storing your seeds for a long time, place the paper packages in a mason jar along with one of those little bags of silica you get when you buy a new pair of shoes. Seal the lid tightly. Seeds stored in this manner can last a couple years or longer.

Organic Garden Planning



There are numerous strategies you can employ when planning your organic garden. It all depends on what you want to achieve as an end result.

To make your garden aesthetically pleasing, you can plant everything in neat little rows that are meticulously aligned. Raised beds can be installed to vary the height of your garden and you can plant climbing plants or flowers that will climb up ugly fences and obscure them.

On the other hand, if you're not worried about aesthetics, you can group plants with similar needs together to make watering and care for the plants easier.

Smaller areas are going to require small plants that don't have a huge footprint. A good option for smaller areas is vining plants that you can grow vertically instead of horizontally. You can even grow melons on a trellis if you figure out a way to support the melons as they grow. If you have a larger plot, you can spread things out a bit and let your melons grow horizontally.

You're going to want to plan where you're going to plant the items in your garden based on how much sunlight they need. The seed package

will list how much sunlight the plant is going to need. Here are the options you're most likely to see:

- ☐ **Shade.** Shade means a plant can live in a shaded area. It's going to need some sunlight, but it will need less than 4 hours a day.
- ☐ **Partial sun.** Partial sun means the plant needs between 4 to 6 hours of sunlight a day.
- ☐ **Sun.** The plant is going to need 8 hours or more of sunlight a day.

In order to figure out how much sun certain areas of your garden are going to get, you're going to have to pay close attention. Areas close to trees, buildings, fences and other items that obstruct the sun are probably going to be good places for shade or partial sun plants, depending on just how much sun they get. Areas out in the open that get no shade are going to require sun-loving plants.

Here's something else to keep in mind. If you're planting something that's going to grow to a few feet in height or taller like corn or grape vines, you're going to have to consider the impact the taller plants are going to have on smaller plants as far as shade is concerned. Small plants that require a lot of sun may not get enough when tall plants start to stretch out.

You can use this knowledge to your advantage. For example, you could plant a larger plant with big, bushy leaves and let it grow for a while, and then you could plant smaller plants beneath its canopy that require shade. Using this method allows you to grow shade or partial sun plants out in the open. You just have to grow the taller plants first so they provide the shade.

The Benefits of Companion Planting



Companion planting is a term used to describe the act of placing plants together that benefit each other. Planting large plants first and using them as shade for smaller plants is a form of companion planting.

The following chart lists some companion crops you might consider.

Companion

Nasturtiums attracts caterpillars, which will keep them away from the greens.

Moroccan chard deters aphids and attract bugs that eat aphids.

Corn (in the shade) keeps the ground damp so corn can take off.

Anise attracts wasps that prey on aphids.

Blanching the two together improves taste and growth.

Beans store nitrogen and return it back to the soil when they decompose at the end of the season. Plant beans, then harvest them

and turn them under before planting your next crop.

Garlic improves the flavor of beets

Onion deters the flies of broccoli when planted together.

Carrots loosen compacted soil and attracts beneficial insects

Flowers raise the level of predatory beetles.

Chillies deter slugs.

Keep in mind this is only a tiny sampling of the companion plants that can be paired with one another. If you're interested in more pairings, here's a link to a huge list of companion plants:

[List of Companion Plants](#)

This list also contains items that shouldn't be planted with one another, which is good to know as well. You don't want the plants in your garden competing for resources or attracting insects that will harm their neighbors.

Weeds Gone Wild



Weeds are the bane of existence for many organic gardeners.

No one likes to see weeds popping up left and right in their garden like uninvited guests to an exclusive party. Most rookie organic gardeners froth at the mouth at the sight of any weed that dare show its face in their garden plot. They make it their personal mission to seek and destroy every weed that pops up as soon as it shows its face.

The experienced organic gardener learns to turn a blind eye to all but the most harmful of weeds. You can let a weed or two grow and it won't be the end of the world—or your garden for that matter.

We would prefer weeds didn't grow in our garden at all, but it's inevitably going to happen. You can learn to live with them and even use them to your benefit. If you get a growth of weeds, keep them back away from your plants and let them grow a bit, then turn them under *before they start to grow seeds*. You'll get rid of the weeds and provide your garden with some added nutrients.

Annual weeds like chickweed and groundsel can grow multiple generations of plants in a single season. They spread fast and need to be turned under before they produce seed. A single annual plant can release tens of thousands of seeds if allowed to live long enough.

Perennial seeds can attack from two angles.

They are often capable of producing seeds, plus they send out tendrils that creep just beneath the surface that can sprout up a good foot or two away from the original plant. Perennial weeds are problematic in that you can't just turn them under and forget about them. A small piece of root can sprout into a new plant, so you might actually stimulate weed growth if you turn this type of weed under.

These weeds need to be pulled by hand and can be added to your compost pile. When you pull them make sure you get the entire root or they'll grow back. Try running a screwdriver down the length of the root before you pull the weed.

As an organic gardener, you're somewhat limited as to your options for weed control. Here are some of the more effective means of weed control you have at your disposal:

- ☐ **Pull them.** You can get rid of weeds the good 'ol fashioned way—by hand. Pull weeds out by the root to ensure they don't grow back.
- ☐ **Mulching.** We discussed this earlier. A good layer of mulch can help hold weeds at bay. Turn existing weeds under and lay a thick layer of mulch over the top. It'll kill the existing weeds and help prevent new weeds from growing through the mulch. Any weeds that do grow will be easy to pull.
- ☐ **Bunch your plants together closely.** If you bunch your plants up, weeds won't have much room to grow.
- ☐ **Pour boiling water on them.** Boiling water will kill weeds. Just be careful not to splash it on the plants that are close by because it'll kill them, too.
- ☐ **Cover weeds with plastic.** Lay a layer of plastic down right over the top of them. Clear plastic in sunny weather is especially effective because it heats the ground up and the weeds can't survive. Black plastic is another good choice because it blocks light from reaching the plants.
- ☐ **Fire.** You can use a flame weeder to burn off pesky weeds. If you go this route, be careful. You don't want to catch anything else on fire.
- ☐ **Put wet newspaper on top of them.** This method works in a manner similar to that of laying plastic on top of them, in that it smothers the weeds by preventing sunlight from reaching them.

□ **Lay down weed barrier cloth.** Laying down a weed barrier cloth and placing mulch over the top of it limits the area in which weeds can grow. Cut holes in the cloth where you want your plants and leave the rest of the ground covered for best results.

□ **Plant cover crops.** Plant a cover crop to suppress weed growth. Turn the crop over into the soil before it flowers and turns to seed. Cover crops make great mulch. They fight off weeds and help prevent disease.

□ **Apply a vinegar-salt water solution to them.** Spray vinegar and salt water on the stems of weeds and watch them dry up and die within a week. This solution is potent and will kill any other plants it comes in contact with, so exercise caution.

Preemptively Strike With Corn Gluten Meal

Corn gluten meal (CGM) is a powdery byproduct created when corn is milled. It is packed full of protein and nitrogen and works well for weed control when it's laid down before weeds begin to emerge. CGM controls weeds by preventing their roots from growing. It doesn't have any effect once weeds have sprouted and taken root. Perennial weeds that are already rooted and annual weeds that have already sprouted won't be stopped by CGM.

CGM can be used on lawns to control weeds and it serves a double purpose as a natural fertilizer. You can use it in your organic garden, but make sure you give seedlings time to take root before laying it down. If you sow your seeds directly into the soil, don't lay down CGM until after your seeds are growing well.

Top Ten Worst Garden Weeds

The following weeds are the biggest threats to your garden. They'll bully their way into your garden plot and will spread quickly, competing with your plants for nutrients and water. When you see these weeds, it's time to take action.

Bermuda Grass



They don't call this stuff devil grass for nothing. It's one of the most difficult weed species to kill, plus the roots emit chemicals that repel other plants. It grows so fast you can almost watch it expand. A single shoot of grass can become a 15-foot wide patch in a matter of weeks.

Whatever you do, don't try to till this grass under. Every little piece that breaks off can sprout into a new plant. It's like spilling water on a Gremlin. Dig it out by the roots and lay plastic down over the infested areas. It's a war of attrition and you're only going to win if you're more tenacious than the grass.

Bindweed



Don't let the bright green leaves and pretty flowers fool you. Bindweed is a fast-moving plant that will grow rapidly once it's established itself in your garden. A single plant will send out hundreds of shooters and has roots that can reach as far as 30 feet into the Earth. To top things off, the seeds can stay dormant in the ground for as long as half a century.

Covering them with plastic might work, but they've been known to send tendrils out as far as 20 feet to get beyond the edge of plastic sheeting. You can try to dig them up, but you're going to have to be thorough. A tiny piece of root can turn into a plant at a moment's notice.

The best line of attack is to till them under as soon as they emerge, then cover the area with plastic sheeting. Even then, you're probably going to have to do it multiple times before you get rid of this hardy

weed—if you ever fully get rid of it.

Chickweed



Chickweed grows fast and seeds even faster. It's hard for non-organic gardeners who have no problem spraying it with herbicides to get rid of; it's even harder for us organic gardeners to kill.

Hand-pull it and cover the area where it was with mulch. You can mow it down like grass and then turn the rest under. Cover it with plastic to ensure it dies off.

Common Purslane



Purslane is another prolific seed-producer. A single plant can produce hundreds of thousands of seeds and will rapidly colonize any area it gains a foothold in.

Mulches can be used to control purslane. Turn them under and put a thick layer of mulch over the top. Clear plastic mulch can be placed over purslane plants in the summer to kill both the plants and the seeds.

Crab Grass



Crab grass isn't the worst invasive weed, but it's the most proliferate. It goes into overdrive as the weather turns hot and sprouts up in gardens and lawns all across North America.

To get rid of it, pull it out by hand before it has a chance to spread. Follow a piece of the grass down to the base of the plant and pull it from there. If not, it will sprout right back up and start growing like crazy.

Dodder



Also known as strangleweed, this pesky plant wraps itself around the plants in your garden and chokes them out of existence. It's a parasitic predator that actually punctures the stems of other plants and sucks the nutrients out of them. Dodder seedlings begin looking for a plant to attach to as soon as they start to grow.

If you've got a dodder infestation, you've got your work cut out for you. Pull all of the weeds and put them on the burn pile. Don't turn them under or add them to your compost pile, as you don't want to take the chance of them growing back.

Leafy Spurge



Leafy spurge looks like something out of a horror movie. It acts like a nightmare creature, too. It spreads fast and actually produces chemical toxins that kill off other nearby plants. To top things off, it can shoot its seeds up to 25 feet away.

Hand pull spurge weeds for best results. Try to get all of the

Purple Loosestrife



Another weed with pretty flowers that may fool you into thinking it's OK to have around; purple loosestrife produces *millions* of seeds per plant per year. If you have multiple purple loosestrife plants growing in your garden, billions of seeds could be spread once they go to seed.

Dig loosestrife out by hand and dispose of the plants by burning them. Alternatively, you can snip off all of the flower heads as they present themselves before they go to seed, but digging them up is the best option.

Ragweed



Ragweed can grow up to 20 feet tall and is difficult to get rid of once it's established. If you or your family members have allergies, you want to get rid of any ragweed plants in your garden before flowers start to form. They are one of the biggest offenders when it comes to pollen allergies. A patch of ragweed plants can fill the air with billions of pollen spores come spring.

Pull ragweed plants by hand. If they haven't gone to seed, you can turn them under or add them to your compost bin. If they have started to produce seeds, burn them in a burn pile.

Thistle



Thistle is one tough plant. It's one of the few weeds capable of doing the careless gardener physical harm by poking through garden gloves. It grows out of control and can complete take over a garden plot.

To kill thistle, treat the stems with a salt water and vinegar solution. Just keep the solution away from the plants you want to keep because it will kill them as well.

Irrigation: Watering Your Plants



It would be nice if Mother Nature provided us with all the water we need to water our gardens. We could sit back and watch as it rained every few days and soil stayed nice and moist.

We all know that isn't the case.

We plant our gardens and then pray for April showers that never come. Or they do come, but instead of showers they end up being torrential downpours that wash our plants away.

It's up to us to make sure our gardens get enough water. The right amount of water for your garden largely depends on the type of soil you have.

Loam does a good job of retaining just the right amount of moisture while letting excess water drain away. It dries out at a moderate pace. Clay absorbs water slowly, but once it's absorbed, it tends to hold it in because it doesn't drain well. Sandy soil drains quickly and dries out fast.

In order to better regulate the amount of water your soil is able to hold at any given time, apply generous amounts of compost. Turning compost into any type of soil improves its ability to hold water.

You're going to want to keep the soil in your garden damp, but not soaking wet. To test whether your garden has enough water content, try sticking a screwdriver into the ground and pulling it out. If it comes out dusty and dry, you need to water your garden. If it has pieces of damp soil stuck to it, you're probably good to go. You're going to need to apply more water to a garden with a lot of compost in it at watering time. The tradeoff is it won't have to be watered as often.

Watch your plants for signs they're starting to wilt. Limp leaves and a saggy appearance are precursors to conditions like *water stress*, which is a more serious condition that indicates your plants are severely lacking the water they need.

Some plants will wilt a bit in the heat of the day and return back to normal when it cools off. This is normal and shouldn't be viewed as a warning sign. On the other hand, if you get up in the morning and your plants look wilted while it's still cool out, they could probably use more water. Severe water stress over an extended period of time can result in dried out leaves and stunted or deformed fruits and vegetables.

Most plants do best when they're watered infrequently and deeply. What this means is you need to vary your watering times, but when you do water the plants, give them enough water to moisten the first 10 to 12 inches of soil. This encourages plants to drop deep roots to seek out every last drop of water they can get. Deep-rooted plants will be stronger and more resistant to inclement weather and drought.

For best results, water your plants early in the morning or in the afternoon after it cools down a bit. You don't want to water in the

heat of the day because you'll lose a lot of water to evaporation before it can penetrate into the soil.

Don't wait until too late at night. Leaves and foliage that are wet create conditions conducive to fungal growth. Plants should be watered a couple hours before dark, so the leaves have a chance to dry before the sun goes down. This is especially important if you use an irrigation system like a sprinkler that sprays water all over the plants themselves.



Drip irrigation is a more efficient means of watering your garden. It consists of a long hose or rubber pipe with holes in it by each plant. As the water runs through the hose, it leaks out of each of the holes, watering the plants at the base where the stem enters the ground. You lose less water to evaporation this way and you don't soak the entire plant with water, which is how mold and fungi take hold.

If you're watering with a hose or watering can, get the water down to the base of the plants. Sprinkling the tops of your plants isn't going to get the job done.

You can check to see if your soil is wet enough by sticking a large screwdriver or long stick 10" into the ground. If the length of the stick has damp dirt stuck to it when you pull it out, you've watered for long enough. A soil sampling tube is an even better way to check your soil. Push it into the soil and pull it out and you can easily see whether your soil is damp enough.

You can cut down on watering costs by storing rainwater during the wet season. You can attach a rain barrel or two to your downspouts to gather up water that can be used in your garden later on in the year.

In addition to under-watering your plants, you want to avoid overwatering them as well. Too much water is just as bad for your plants as not enough. The soil should be kept damp, but not soaking wet. You don't want your plants to float away!

Bugs!



Bugs can do a number on your crops in no time flat. One minute they're sitting there looking pretty; the next they've got holes in the leaves and are badly wilting. Insects are eventually going to find your garden and it's important to know what to do about them.

The first thing you can do is preemptively strike by mixing things up a bit. Mix various types of plants and try to intersperse plants of various heights and colors. Some bugs will be repelled by this alone.

You can plant "decoy" plants that attract harmful bugs like aphids and keep them away from your good plants. Yellow nasturtiums can be planted near plants that normally attract aphids. The aphids will swarm the nasturtiums after they flower. Pull them out and get rid of them to clear the garden of a large percentage of the aphid population.

Your next line of defense is to plant items that attract beneficial insects.

Dill, parsley and carrots all call in wasps that eat caterpillars. Fennel, dill and coriander all attract lacewings, which lay eggs that hatch into larvae that eat aphids. Ladybugs and their larvae also dine on aphids. They're attracted to dill, yarrow, fennel, dandelion and buckwheat. Hoverflies eat all sorts of bugs. Plant lemon balm, yarrow, bugleweed, dill or spearmint to attract them. Your best bet is to plant attractor plants interspersed amongst the other plants in your garden.

Make sure you get rid of fallen fruit and rotting vegetables as soon as you notice them. They provide food and safe harbor for pests. Getting rid of them cuts down on the food supply of your pests and makes it less likely your garden will attract more bugs than it already has.

You can repel flying insects by setting up row covers. These covers are made of a mesh-like material bent in a U-shape that sits over the top of your plants. It keeps airborne bugs from flying down and landing on your plants.

Aphids



One pest found in gardens across the globe is aphids, which are harmful pests that attack your plants by the thousands. You can get rid of these little bugs by spraying them off with water. Keep them away by applying a hot-pepper or garlic-spray to the plants.

Caterpillars



Caterpillars may look cool, but they're anything but your friend when it comes to your garden. They look like thick worms with legs and come in a number of colors, shapes and sizes.

Caterpillars can be hand-picked and disposed of as you see them on your plants. You can also get rid of them by planting items that bring in predatory wasps and insects that dine on them.

If you have a bad infestation, you're going to need to do something drastic. *Bacillus thuringiensis* (Bt) spray is an organic insecticide you can use to kill off a caterpillar infestation.

Sow Bugs and Pill Bugs



I'm sure you've seen this little guy around. He's the one the kids call a "roly-poly" because he rolls up into a little ball when he feels threatened. Sow bugs and pill bugs look almost the same, but are actually two different bugs. Pill bugs can roll into a ball, while sow bugs can't.

Your garden is going to attract a few of sow bugs and pill bugs. In small numbers, they probably aren't going to do too much damage. If the population starts to get out of control, they may start dining on your plants, but even then it's unlikely.

If you can't stand them and want to get rid of them, set up a trap like a large, flat board set over a piece of damp cardboard. When the sun comes up, they'll move under the wood to hide. You can dump them in a soapy water solution to kill them off.

Nematodes



Nematodes are tiny worms living in the soil of your garden. Most are beneficial, as they eat bacteria and fungi. You'll never see nor hear of the good nematodes.

Like any group of animals, a few bad seeds can give an entire group a bad name. *Plant-parasitic nematodes* are the black sheep of the nematode family. Instead of eating bacteria and fungi, these nematodes eat plants. They use a mouth spear to puncture their way into the roots of plants. Once inside, they start sucking them dry.

One or two nematodes wouldn't cause too many issues. The problem is nematodes don't travel in ones or twos. When your plants get attacked by nematodes, their roots get punished by large swarms, all looking to drain them of their nutrients.

The effects of a nematode attack are similar to that of under-watering. Plants will start to yellow, growth will be stunted and plants can even die off. Nematode attacks usually start in small sections of your garden and slowly spread out. If the rest of the garden looks healthy and one or two sections are slowly but surely dying off, you may have nematodes.

To determine whether your garden is being attacked by nematodes,

your best bet is to send a sample in to be tested at a lab. Testing will run you between \$15 and \$50.

There are a number of methods used to treat nematode-infested soil. Here are the best options for a home garden:

- **Flooding.** If you have a hard-pan layer of clay or rock below your soil, you can flood your soil and leave it flooded for a couple weeks. Let it dry, then flood it again and leave it flooded for a couple more weeks.
- **Solarization.** You can lay clear plastic over the infested area and let it sit for a month or two. This works best in areas that get a lot of sunlight because heat is required to kill nematodes.
- **Cover crops.** Plant cover crops that the nematodes in your area can't feed on. This will cause their population to decrease and eventually start to die out. Combine cover crops with organic compost for best results. Marigolds are a great cover crop to plant and turn over to suppress nematode populations.

Disease & Illness



Yet another problem you can have with your plants is disease. There are literally thousands of diseases that can attack the various plants in your garden. The key to treating most diseases is to identify them early and take action to put a stop to them.

It's important to identify the disease before attempting to treat it. What works to treat one disease may make another disease even worse.

Let's take a look at some of the more common plant diseases out there. Keep in mind this is only the tip of the iceberg when it comes to disease. I'm just trying to give you an idea of what you might experience.

Blight



There are quite a few different strains of blight floating around. Most of them have similar symptoms. Leaves develop brown spots and your plants literally start rotting away in front of your eyes.

There is no cure for some of the more virulent forms of blight. Fire blight is a particularly bad strain that affects trees and shrubs. Your only recourse is trimming back the affected areas or getting rid of sick plants and hoping it doesn't spread.

Speaking of spreading, blight spreads easily and can be spread by you when you move yourself and your garden tools to a different area of your garden. If you have plants with blight don't use the same tools on them that you use on the rest of your garden.

In areas where blight is a common problem, you can spray a baking soda solution on the visible areas of most plants to protect them from blight.

Cankers



Cankers are either growths or sunken areas in wooden stems or branches. They're formed when a particular type of fungus attacks an area of a tree.

Get rid of cankers by cutting off the affected branch and disposing of it.

Club Root



By David B. Langston [CC-BY-3.0 (<http://creativecommons.org/licenses/by/3.0/>)], via Wikimedia Commons

Club root is a fungus that damages the roots of vegetables in the cabbage family. The roots swell up and get deformed.

The best way to rid yourself of a club root problem is to take action to raise the pH of your soil above 7.0 prior to planting your crops.

Frozen Plants



It never fails. You wait until after what should be the last frost of the season to put your plants in the ground and even wait an extra week or two for good measure. Your plants are coming along nicely and everything looks great. Then it happens. A cold front moves in and freezes everything. You wake up one morning to find your garden covered with a thick layer of frost.

Panic sets in, and in many cases, rightfully so.

While your garden plants may survive a minor frosting where only the leaves are frozen, many warm-weather plants like tomatoes and peppers probably aren't going to survive if the freeze is deep enough to freeze the plants and stems.

If you know a freeze is coming, you may be able to save your plants from freezing by covering them with a sheet or blanket. For an additional layer of protection, place a sheet of plastic over the top of the blanket. Always keep a layer of cloth between the plants and the plastic.

When morning comes, remove the cloth and plastic and let your plants sit out in the open all day. Failure to do so can create condensation under the plastic that can freeze come nightfall.

There isn't much you can do to save your plants from a deep,

prolonged freeze. You can mulch the area heavily and cover your plants, but it may not be enough. Try heating up jugs of water and placing them by your plants.

Even then, it may not be enough. Sometimes all you can do is keep your fingers crossed and hope for the best. If your plants are damaged or die off, don't give up. It's all part of the game. If organic gardening was easy, everyone would be doing it.

Mildews and Molds



You don't want mildews and molds in your home. You don't want them in your garden either. When you water your plants and leave the leaves wet at night, you're opening yourself up to all sorts of mildew and mold growth.

Powdery mildew is probably one of the easiest plant diseases to recognize. If you've got a powdery white substance on the leaves or even the fruits and vegetables in your garden, you've probably got a powdery mildew problem.

When you first see the signs of powdery mildew, remove any affected leaves and treat the rest of your plant with a baking soda solution. Add a tablespoon of baking soda and a tablespoon of dishwashing liquid to a gallon of water and spray your plants with it.

If your plants are badly infected, you can either rip them out and start over or try treating them with Neem oil. You can prevent powdery mildew from forming by spraying your plants down with water when you get up every morning.

Downy mildew is less common, but can be just as destructive. It forms when plants are left wet for long periods of time, like overnight. If only a small area is infected, prune the area off and keep a close eye

on your plant. If it's a large area or the whole plant that's infected, pull the plant before it spreads to the rest of your garden. Prune your plants back so there's ample space between them to prevent downy mildew from rapidly propagating.

Don't throw plants with mildew or mold issues in your compost pile. They need to be burned to get rid of the spores before they spread.

Rot



Rots are diseases that cause your plants, flowers or produce to begin prematurely rotting. The following types of rot are common in the United States:

- ☐ **Fruit rot.** Fruit starts rotting prematurely while it's still attached to the plant. Entire fruits can go bad and rot right off the plant.
- ☐ **Fungal rot.** Mushrooms or other types of fungi begin to grow on plants and trees.
- ☐ **Root rot (pictured above).** Roots wither and rot away on otherwise healthy plants.

Treatment of rot is largely dependent on the type of rot you're experiencing. Bring a sample to your local garden center and ask them if they can identify it for you. It may be something common that they know how to treat.

When Animals Attack



Our furry friends are fun to watch.

Rabbits, snakes, lizards, gophers, deer and squirrels are all entertaining creatures when they're out and about in their natural habitat. The problem is they don't always stay in their natural habitat. There are a lot of animals who will make short work of the plants in your garden if they discover you're growing tasty produce.

In order to protect your garden, it helps to know what kinds of animals are prevalent in your area. It's no fun to fence off your plot to protect your garden from marauding deer, only to find gophers have moved in and started chewing off the roots of your plants.

Keep an eye on your garden and watch for the early signs of animal damage. Animal droppings and paw prints are both signs something has been scouting out your garden. Chewed leaves and missing flowers are another warning sign.

A well-built fence or a protective covering over or around your plants is the best way to keep roving animals like deer and raccoons away from your plants. They'll bully their way right through a flimsy fence, so you have to make sure you build something that can withstand some abuse.

Make sure your fences or cages are tall enough so the animals you're trying to keep out can't jump or climb them. Deer can jump fences up to 5 feet tall. Add a second fence half the height of your first fence a few feet behind your first fence to further confuse animals looking for a quick snack.

If raccoons are invading your garden, you may have to electrify your fence to keep them out. They're good climbers and can scale most short fences. Add a strip of electrified wire to the top of the fence and they'll steer clear of it.

Fences also keep rabbits at bay. A short, 3-foot fence is all that's needed to keep rabbits from nibbling on your tender greens.

Repellent sprays may work in smaller gardens. Mix water with eggs and spray it on plants to repel deer. Exotic animal manure is another option that can sometimes keep animals at bay. Repellent sprays sold in stores can be hit or miss. If you decide to try one, make sure it's made of organic materials.

Burrowing animals can attack from all angles. They'll eat seeds, nuts, fruits, vegetables and leaves from your plants during the day and will attack the roots of your plants from within their burrows by night.

The best way to get rid of burrowing animals is to trap them or otherwise eliminate them. Bait traps with rolled oats or peanut butter. You can use live trap if you want, but the good old fashioned snap traps are still the most effective means of dealing with rodents. If you don't want to trap burrowing pests, you can try covering your plants and sinking a protective fence a foot or two into the ground around your plants and trees.

Another option is to flood the tunnels the burrowing animals live in. Find their tunnels, stick a garden hose in it, turn it on and let the tunnel fill up.

Harvest Time



You've toiled away and spent countless hours babying your garden to perfection. You've pulled weed after weed and fought off wave after wave of pest. It's time to reap your reward.

Here's a plant-by-plant guide indicating when to harvest some of the more popular crops you may plant.

Beans



Bean pods should be stiff and able to be snapped in your hand. The pods should be a bright green color. Beans don't all mature on the vine at the same time. You'll need to harvest your beans every couple of days during harvest season.

Carrots



You can let your carrots sit in the ground for a while and you probably don't have to worry too much about them. Make sure you harvest them before rainy season or heavy frosts because they have a tendency to split open. They're ready to be harvested when their stalks are about $\frac{3}{4}$ of an inch in diameter.

Corn



Corn should be harvested a few weeks after silk appears. You'll know it's ready when you start to see kernels at the end of ear. Watch for the ends of the husks to start to dry out.

Crucifers (Broccoli and Cauliflower)



Cauliflower needs be harvested when the heads turn white and start to smooth out. Broccoli should be harvested before the flower buds start to open.

Chill them immediately after picking them to ensure they retain their flavor.

Cucumbers



Harvest cucumbers while they're a bright green color and are nice and firm. If you let them sit on the vine too long they'll start going soft. New cucumbers won't grow on the vine until you harvest the ones already on it.

Flowers



Care to take a guess when the right time to harvest your flowers is?

That's right, when they bloom. Be sure to trim back any dead or dying flowers.

Lettuce and Cabbage



Harvest when the heads feel solid to the touch and are the right size for the type of lettuce or cabbage you've planted. Cut the entire head from the ground when you harvest it.

Onions and Potatoes



Onions will stop growing and the leaves will begin to lose their color when it's time to harvest. If you see leaves that are flopped over, wait a week and harvest your onions. After pulling them from the ground, let them sit out in the sun for a day or two so they dry out a bit.

If you're planning on storing your onions, they need to be cured. After letting them sit out in the sun for a day, cover them with a light cotton sheet and let them sit out for another week or two. The idea is to dry out the outside so it doesn't start to go bad when you store the onions.

The plant portion of potatoes will die off when potatoes are ready to be harvested. Let them stay in the ground for a week or two after the plants die and then dig them up.

Potatoes need to be cured if you're going to store them. Leave them sitting out in a cool area where the temperature is around 75°F for a couple weeks.

Strawberries



Strawberries are one fruit where there's no doubt when they're ready to be picked. They turn a bright red color to let you know they're ready to be picked. Leave them on the vine for a day or two after they turn red for the best flavor.

You have to watch your strawberry plants closely because the strawberries on them won't all ripen at the same time.

Tomatoes



Tomatoes are ready to harvest when they turn a ripe, red color. It's easy to tell when tomatoes are ready. Pick them before they start to go soft. You can pick mature tomatoes while they're still somewhat green and let them ripen off the vine.

Watermelon



Watch for watermelon to start turning yellow on the bottom. This indicates a watermelon that's close to being ripe. Watermelon tastes best right fresh. Eat it right after you pick it for best results.

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